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Mariners Weather Log

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Mariners Weather Log

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Front Cover: The 40-ft. yacht SAO TOME was blown ashore at Hatteras Inlet on the North Carolina Outer Banks on June 19 during a subtropical storm. A tow from the U.S. Coast Guard on June 20 refloated the steel-hulled sailboat. Photo by J. Foster Scott.

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The Secretary of Commerce has determined that the publication of this periodical is necessary in the transaction of the public business required by law of this Department. Use of funds for printing this periodical has been approved by the Director of the Office of Management and Budget through April 1, 1985.

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Mariners Weather Log

NORTH ATLANTIC TROPICAL CYCLONES, 1982

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There were five named tropical cyclones in the Atlantic-Caribbean, Gulf of Mexico region (fig. 1). Three of these were tropical storms (wind speeds in the 34-63 kn range), and only two attained hurricane status (winds greater than 63 kn). Considering the number of hurricanes (2), and the number of days (6) a hurricane was on the weather map, this was the quietest season in more than 50 yrs.

By comparison, the average number of named storms each year (based on the past 35 yr of record) is ten, with six becoming hurricanes. The last recorded season with only two hurricanes was 1931 and since that time only one other year, 1972, had fewer tropical storms (4), but three of these became hurricanes. A summary of the 1982 cyclone statistics is given in table 1.

The major shipping lanes in the North Atlantic were affected by only two systems--a subtropical storm in mid-June, and hurricane Debby in mid-September. However, there were several strong low-pressure systems in late October and November that possessed some of the characteristics found in tropical cyclones. The unusually tranquil summer and early fall can be attributed to unseasonable westerly winds in the upper atmosphere overlying the lower atmospheric easterly trades. The shearing effect of this pattern

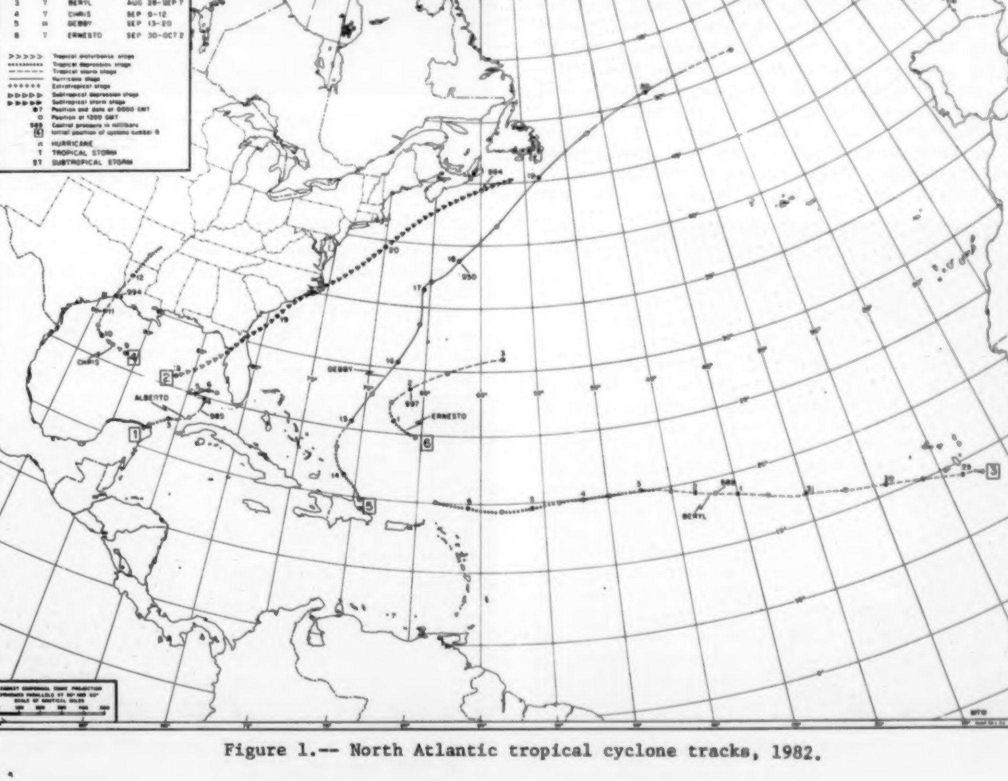

Figure 1.-- North Atlantic tropical cyclone tracks, 1982.

Table 1.--Summary of 1982 North Atlantic Tropical and Subtropical Cyclone Statistics

Cyclone Number	Name	Class	Dates	Maximum Sustained Winds (kn)	Lowest Pressure (mb)	U.S. $ Damage (millions)	Deaths
1	Alberto	H	2-6 Jun	75	985	Minor	23 (Cuba)
2	---	ST	18-20 Jun	60	984	10	3 (FL)
3	Beryl	T	28 Aug-6 Sep	60	988		
4	Chris	T	8-12 Sep	55	994	2	
5	Debby	H	13-20 Sep	115	950		
6	Ernesto	T	30 Sep-2 Oct	60	997		

T = Tropical storm (winds 34-63 kn)
H = Hurricane (winds 64 kn or higher)
ST = Subtropical storm (34-63 kn)

inhibited the process of tropical cyclone development during most the 1982 hurricane season.

HURRICANE ALBERTO, JUNE 2-6

Ship reports and satellite pictures received on June 2 indicated a tropical depression was forming in the southeastern Gulf of Mexico, and this was confirmed by a reconnaissance aircraft that afternoon. The system moved slowly east-northeastward and developed into hurricane Alberto on June 3 as winds increased to 75 kn (fib. 2). Alberto was a hurricane for only 12 hr then rapidly lost strength early on June 4 as the upper level pattern necessary to sustain a hurricane was destroyed by a high-level westerly jet. The remaining low-level cloud circulation remained visible on satellite pictures (fig. 3), as it drifted aimlessly around the southeast Gulf of Mexico before finally dissipating on June 6.

The only gale force winds reported by shipping was a 40 kn observation from the U.S. Coast Guard vessel DILIGENCE at 0600 June 3 in the Yucatan Channel. Gale winds and heavy rains were reported

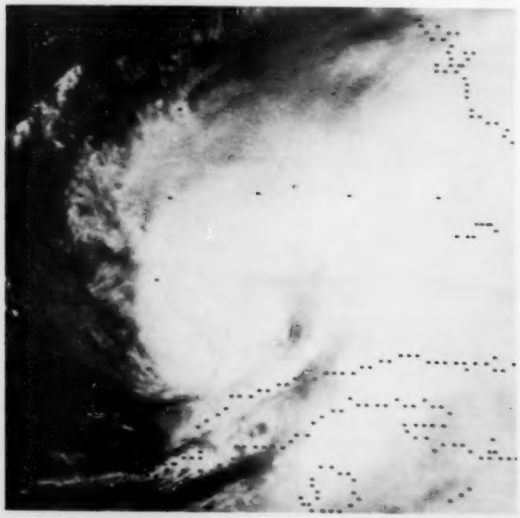

Figure 2.-- Alberto at 1531, June 3, 1982.

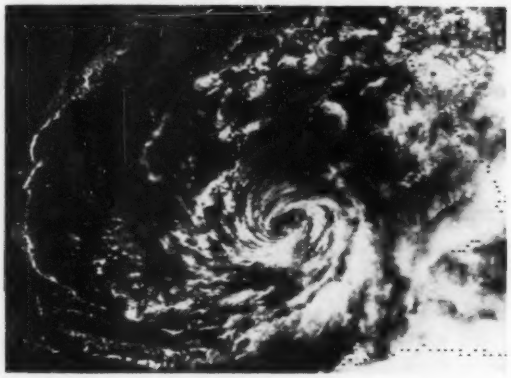

Figure 3.-- Low-level circulation of Alberto 27-hrs after figure 2.

in the Lower Florida Keys, but damage was minor. Flash floods in western Cuba caused 23 deaths.

SUBTROPICAL STORM, JUNE 18-20

A tropical disturbance moving northward into the central Gulf of Mexico on June 17 interacted with a strong upper-level trough and moved rapidly northeastward across northern Florida as a developing subtropical storm on the morning of June 18. The storm skirted the U.S. mid-Atlantic States coastline on June 19 (fig. 4) and raced

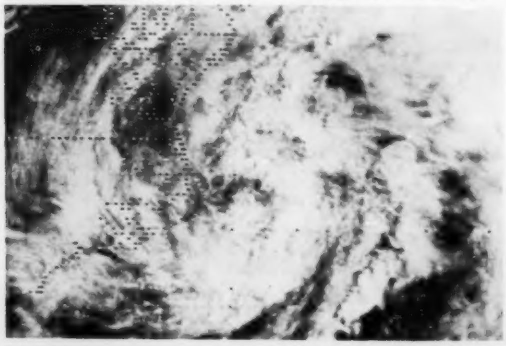

Figure 4.--The subtropical storm off Cape Hatteras at 1331 June 19.

northeastward, passing south of Nova Scotia on June 20. Similar situations occurred in June 1959 and 1974 when there was also minimal tropical storm activity. This type system can be especially dangerous to shipping as winds occasionally approach hurricane force.

The Bi-Annual Newport, Rhode Island to Bermuda sailboat race was scheduled to begin on June 18 about the same time the subtropical storm was forming in the northeast Gulf of Mexico. The forecast track of the storm would intersect the projected course of the sailboats, so it definitely posed a threat to the estimated 185 boats in the race. After much debate, the race was postponed for only the second time since it was inaugurated in 1926. On the morning of June 19 reports of hurricane-force gusts and seas of 30 to 35 ft were received from the tug PATRIARCH, located about 100 mi east of Cape Hatteras, N.C. This information so influenced the racing committee that an unprecedented second postponement was made and the race did not begin until the 20th. Subsequently, reports from ships in the projected track of the race indicated a potential marine disaster was prevented by the delay of the race.

Several other ships off the southeast United States coast reported gales and high seas. The Exxon HUNTINGTON (KEAJ) observed winds gusting to 70 kns and seas of 25 to 30 ft at 1800 June 18. Gale warnings were issued over north Florida on the 18th of June and extended to Rhode Island during the passage of the storm. High tides and waves produced considerable beach erosion and damage to waterfront buildings along the Florida west coast from Naples to Tampa. Severe thunderstorms accompanying the low triggered several tornadoes and produced heavy rains resulting in three deaths in central Florida. The storm's effects on land areas north of Florida were relatively minor. Total damage estimates were around $10 million.

TROPICAL STORM BERYL, AUGUST 28-SEPTEMBER 6

For almost 3 mo after hurricane Alberto formed none of the many disturbances tracked by the National Hurricane Center developed into tropical cyclones. Finally, in late August a well organized weather system moved westward into the Atlantic from Northwest Africa. By the evening of August 28 satellite pictures indicated tropical storm Beryl had formed. The storm passed just south of the Cape Verde Islands on August 29 and continued westward into the central Atlantic (fig. 5), where Beryl reached maximum strength of 60 kn on September 2. Thereafter, as the storm moved westward, it encountered the persistent high level westerlies. This destroyed the upper level portion of the circulation, causing the storm to rapidly weaken (fig. 6). The system lost all signs of circulation northeast of the Leeward Islands on September 6. Even though Beryl approached hurricane status, it quite likely would have gone undetected in pre-satellite days because of its course and dissipation over sparsely traveled ocean areas. There were no reports of damage in the Cape Verde Islands or from shipping.

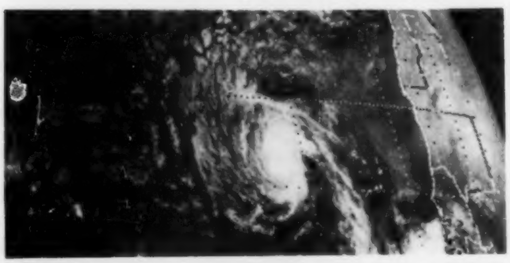

Figure 5.-- Tropical storm Beryl spinning over the data sparce southeast North Atlantic like a galaxy in space.

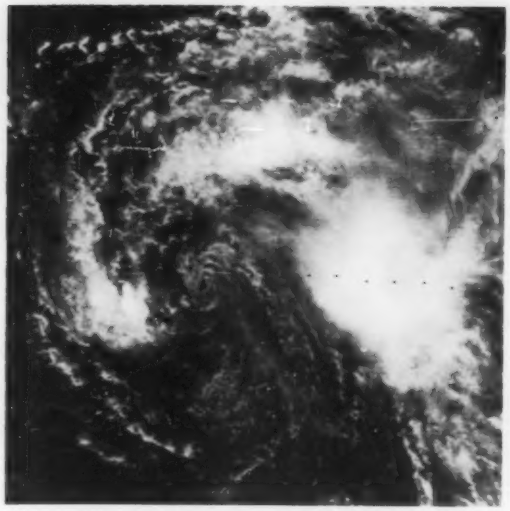

Figure 6.-- Tropical storm Beryl 1501 September 2, probably after peak intensity. Note the high cloud shield has already been blown east of the surface center near 20°N, 46°W.

TROPICAL STORM CHRIS, SEPTEMBER 9-12

On September 9, a low-pressure area forming over the central Gulf of Mexico began to exhibit tropical characteristics as it moved westward. By the morning of September 10 the system had developed into tropical storm Chris as it turned to the north. The U.S. Navy ship SEALIFT CHINA SEA (NHAR) reported southwest winds of 45 kn southeast of Galveston at 0600 September 11, giving the forecasters an early indication that Chris was strengthening. The storm moved into southwestern Louisiana on the morning of September 11 (fig. 7) with its maximum winds of 55 kn reached just prior to landfall.

Offshore oil rigs observed wind gusts up to 70 kn, and tides in excess of 6 ft were reported on the Louisiana coast. There were no casualties reported, and damage estimates were less than $2 million.

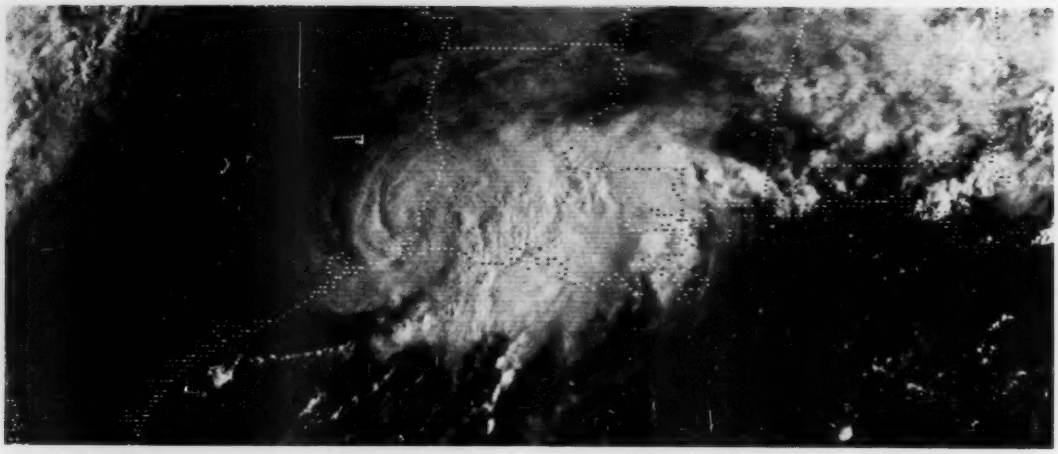

Figure 7.-- Tropical storm Chris over Orange, Texas on the 11th at11331.Note the thunderstorms embedded in the storm to the south and east.

HURRICANE DEBBY, SEPTEMBER 13-20

The only major hurricane of the 1982 season developed from a tropical depression that formed just north of the Dominican Republic on September 13. The depression was upgraded to tropical storm Debby on September 14, as it moved slowly northward away from the Bahamas. Debby strengthened to a hurricane by the evening of the 14th and began a north-northeastward course that would take the center just west of Bermuda on September 16 (fig. 8). At this time winds had reached 95 kn near the center. Fortunately, the strong winds remained west of the island and there was only minor damage reported from the winds gusting to 60 kn.

After passing Bermuda, Debby slowed until it became stationary early on September 17. Debby reached maximum strength with peak winds of 115 kn as it accelerated northeastward during the afternoon. The hurricane passed just south of Cape Race, Newfoundland, on the evening of September 18, producing gusty winds and heavy rains. Debby moved rapidly eastward toward Europe on the 19th and was enveloped by a major storm system over the British Isles on the 20th.

Although Debby passed through the main shipping lanes, none of the weather observations from ships had more than 50-kn winds. The EXPORT CHAMPION (WLCG) reported northeast winds of 50 kn at 1200 September 18, while skirting the storm's center south of Nova Scotia.

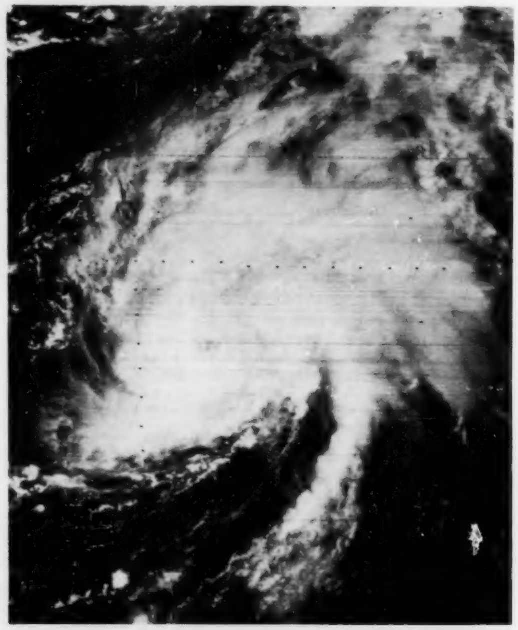

Figure 8.-- Hurricane Debby near 28.5°N, 69°W, southwest of Bermuda.

TROPICAL STORM ERNESTO, SEPTEMBER 30-OCTOBER 2

The last storm of the season developed from a tropical depression that formed some 400 mi north of Puerto Rico on September 30. As the system turned from a northwest to a northeast heading on October 1, the low was designated tropical storm Ernesto. A maximum wind of 60 kn was reported by reconnaissance aircraft late that day. On October 2 Ernesto accelerated toward the east-northeast and slowly weakened until finally merging with a frontal low several hundred miles east of Bermuda. The only ship reporting gale-force winds was the motor vessel ANDRIOTIS. At 1700 on October 2 she reported southerly winds of 35 kn, while located about 75 mi southeast of the storm's now weakening center.

Mariners Weather Log

RIDING THE SWELL

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HIGHSEA SPLENDOUR
Norton, Lilly & Co., Inc.
New York, N.Y.

The scientist Christian Doppler observing an approaching train with whistle blowing, found that the note of the whistle changed on the engine's approach and moving away. He propounded the "Doppler frequency shift." Simply, the frequency of the sound waves was increased with the train's speed when approaching and decreased going away.

The railways came into existence 2 centuries ago. The "Doppler frequency shift" therefore would be of much later vintage. Yet, shipmasters from time immemorial have been aware of the frequency shift and have been unknowingly taking advantage of it. I refer to speed and course adjustments when encountering sea swells.

The statement, "vessel is riding comfortably" reflects the optimum frequency shift of the swell as experienced by a vessel through suitable course and speed adjustments.

A vessel under swell conditions suffers two motions: rolling and pitching. A crest catching up with the vessel lifts that part of the hull it contacts first. This leads to rolling, pitching, or a combination of both.

A sea swell is a long ridge of irregular water having a convex surface on one side and concave on the other. On radar, concave surface being a better reflector gives a sharper image for approaching swell compared to the convex surface of the receding one. However, on a recent Atlantic crossing this statement was not true. On several occasions receding swell gave a better radar picture. These swell appear as striations in way of clutter. On closer examination of the clutter, they are found to resemble rows of loosely laid out ropes on deck parallel to each other. Thus at places, the brights converge, touch, and diverge without losing continuity.

For this striated picture on the radar (fig. 9), the wind has certain contributions to make. Long, low, oily swell, in absence of wind roughening up its surface, often do not show up on the radar.

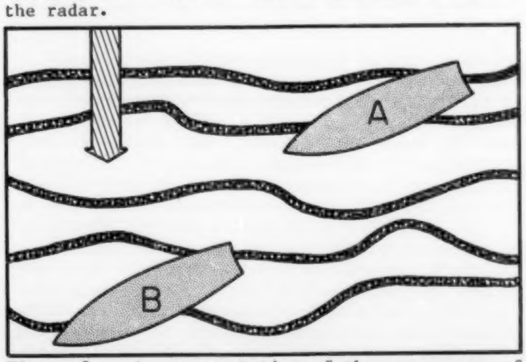

Figure 9.-- A representation of the appearance of waves on radar.

With range markers and range rings simultaneously on, the approximate gap between 2 striations can be measured, which is the wave length. Armed with this length, the passage of time of 2 successive crests across a marker or a ring if noted both for approaching and receding swell, the average rate of progress of the swell can be calculated Table 2 lists a few random observations.

Table 2.-- Some observations of wave lengths, times, and speeds of the waves.

Date	Direction of swell travel	Wave length (km)	Passing time 2 crests	Swell velocity (km/hr)
17/9/82 01°00S 96°00E	005°	.18	11 sec	58
18/9/82 03°30N 88°30E	010°	.13	12 sec	40
24/9/82 11°22N 57°00E	000°	.18	12 sec	54
24/9/82 11°20N 56°25E	005°	.17	14 sec	44

After an alteration of course and/or speed and when a suitable shift in wave encounters have been achieved, the vessel suddenly gives a few vicious lurches and resumes comfortable riding. This common enough phenomenon is attributed to periodic generation of larger waves. It could be so, but it isn't the only reason for lurching.

Refer to the sketch on swell patterns. So long as the vessel keeps negotiating the fair ridges like the vessel marked 'A,' it is riding fair. When the same vessel marked 'B' rendezvous with the deviated crest in the course of their mutual motion, it gives a vicious lurch.

On ocean passages, a vessel sometimes suffers incessant rolling due to the prevalence of sea swells. Besides being uncomfortable, such motion contributes to material damage. How then should one go about adjusting course and speed, without deviating too far off course?

One likes to avoid beam swell. The common practice is, "if the swell is from forward of the beam, bring it closer to the bow." This avoids deviating too far off the course. The result of this action is,

(a) it increases the frequency of encounters
(b) encounters become more vicious as a result of the vessel's motion against the swell leading to heavy pounding, straining and substantial loss in speed.

On the other hand, heavy rolling of the beam swell gets changed to a more welcome mixed-motion (rolling/pitching), as a result of the resultant shifting further forward (fig. 10).

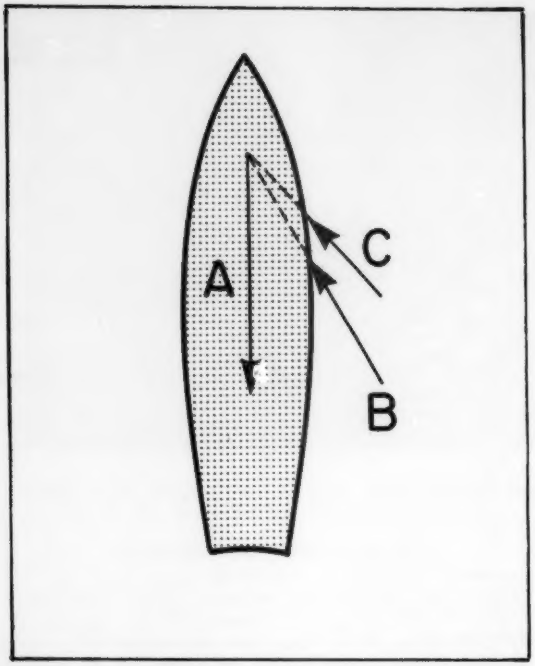

Figure 10.-- Arrow A represents the sea flowing past the hull (ship's speed). Arrow B represents the swell speed. Arrow C represents the resultant which the vessel is subject to with the swell on the bow.

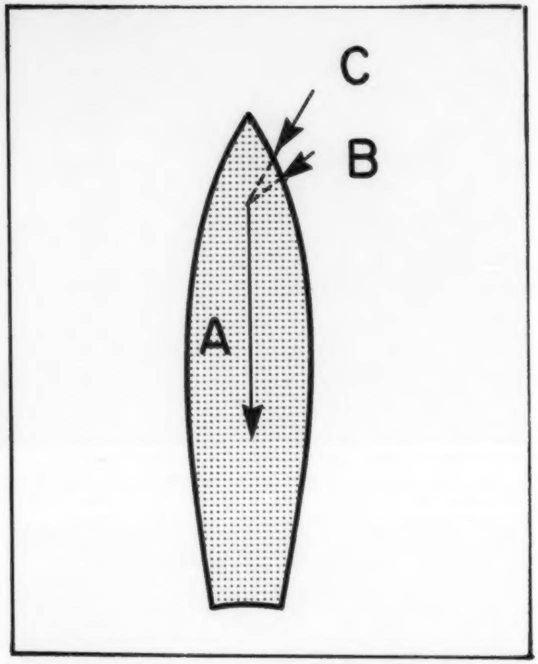

Figure 11.-- Arrows A,B, and C are as in figure 10 with the sea or swell on the stern.

Referring to figure 10, a judicious reduction in speed would contribute to a safer and more comfortable passage.

If the swell is abaft the beam, bring it more to the quarter (fig. 11). The result of this action is,

(a) it reduces the frequency of encounters
(b) it reduces the intensity of the encounters.

Referring to figure 11, as a result of above action, the resultant moves forward of the actual direction. This leads to two options.

(a) Increase speed. Reduce intensity of encounters but increase frequency of encounters
(b) Maintain speed. Maintain intensity of encounters but have reduced number of encounters.

The man on the spot has to be the judge. For the purpose of figures 10 and 11, I have assumed a relationship of ship speed to swell speed as 1 to 4.

Espousing the foregoing steps, I also had in mind "monsoonal swell," "Atlantic rollers" or some such consistent turbulence. Where storm whipped mountainous swells are concerned, forget "Doppler." Just heave-to.

Mariners Weather Log

SIGNIFICANCE OF THE AFRICAN DISTURBANCE

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One of the most commonly observed African disturbances is a major seedling for the development of Atlantic hurricanes. This conclusion is based on satellite observations which have increased the amount of data from sparsely populated regions of Africa and the Tropical Atlantic. Using the Saffir/Simpson Scale, all storms of Level 3 and up having winds of 95 kn or greater that have hit the United States since 1965 were noted to have originated over the African continent. Using the reports by Neil Frank et al. and the National Hurricane Center, "Atlantic Tropical Systems," annual reports from 1968 to 1979, published in the Monthly Weather Review, over 60 percent of all Eastern North Pacific tropical storms originated from African systems. Available data shows over half of the disturbances in the Atlantic can be traced back to Africa. It is concluded that Africa is a significant source of Atlantic disturbances (table 3).

Table 3.--Summary of type of seedling that initiated Atlantic named tropical storms or hurricances. (After Neil L. Frank, et al., Atlantic Tropical Cyclones, 1968 to 1979.)

	Tropical		Baroclinic		
Yr.	Afr. Systems	Disturbances	Upper Trop.	Low Trop.	Total
1968	2	3	1	1	7
1969	7	3	2	1	13
1970	4	2	1	0	7
1971	6	1	4	2	13
1972	1	0	1	2	4
1973	4	2	1	0	7
1974	5	1	1	0	7
1975	5	0	0	3	8
1976	4	0	3	1	8
1977	3	1	1	1	6
1978	6	0	2	3	11
1979	7	1	0	0	8
total	54	14	17	14	99
AVG.	4.5	1.2	1.4	1.2	8.3

54% of Atlantic storms formed from African systems.

The Atlantic Ocean is unique in that tropical disturbances travel a much greater distance before developing into storms compared to other regions, like the Western North Pacific, where development usually occurs much closer to the place of initial detection. The Western North Pacific storms usually form within 10° longitude of detection while African disturbances vary from 10° to 50° longitude for development to occur.

During the summer, an easterly jet dominates the upper troposphere of West Africa. The mountains of East Africa deflect the S.E. Trades, which aid in the formation of the jet. The jet passes over the Cameroon Mountains, which are perpendicular to the flow of the jet. On the leeward side of the range, disturbances are generated and move westward with the easterly flow in the lower troposphere. The Intertropical Convergence Zone, between the dry warm Saharan air and moist flow off the Gulf of Guinea, crosses western Africa. In this area, large-scale surface cyclonic vorticity exists which represents a very good potential for development of these disturbances. These processes are discussed in William M. Gray's "Global View of the Origin of Tropical Disturbances and Storms." On the poleward side of the Intertropical Convergence Zone, areas of large-scale relative vorticity occur. In this area the frictional veering effect of the Ekman Spiral is maximized. The surface convergence and upward vertical motion is enough to develop significant cumulus density to cause tropospheric warming resulting from latent heat release.

The Sahara Desert has a major effect on the flow pattern over tropical Africa. The Sahara is a very warm region with low relative humidity. During the summer months, a thermal low is one of the prime synoptic features over the Sahara Desert. On the south coast of the African bulge, the Gulf of Guinea is an area of cool water caused by a cold water current, called the Benguela Current, moving northward into tropical waters. The subtropical high in the South Atlantic influences the location and movement of this current. The subtropical high is the source for winds from a southwesterly direction, causing a monsoonal flow pattern over Western Africa. This pattern is weak and does not have a major northward persistence above the Equator because of the warm dry air of the Sahara. These climatic features are the major components for the development of the African disturbance.

The initial detection of the disturbance is usually near the Cameroon Mountains, suggesting the possibility of an interaction between the development of convection and surface heating over the higher terrain. The waves are first seen at the 600-700 mb level. The systems move westward at a constant speed of 20 kn. The waves then encounter the moist, low-level monsoon wind. This unstable air flow supports the expansion of the disturbance and the development of convection. Toby N. Carlson analyzed the African disturbances of 1968 in "Some Remarks On African Disturbances and Their Progress Over the Tropical Atlantic." A daily analysis from a network of stations near the West African coast was conducted. A study of these analyses revealed pressure fluctuations with the passage of waves (table 4 and fig. 12).

Table 4.--Frequency distribution of sea-level pressure fluctuation accompanying wave passage at 17°W. (After Toby N. Carlson, 1968: Some Remarks on African Disturbances and their Progress over the Tropical Atlantic.)

PRESSURE INTERVAL (mb):	<1.0	1.0-1.9	2.0-2.9	3.0-3.9	4.0-4.9	≥5.0
NUMBER OF CASES:	3	5	9	10	5	1

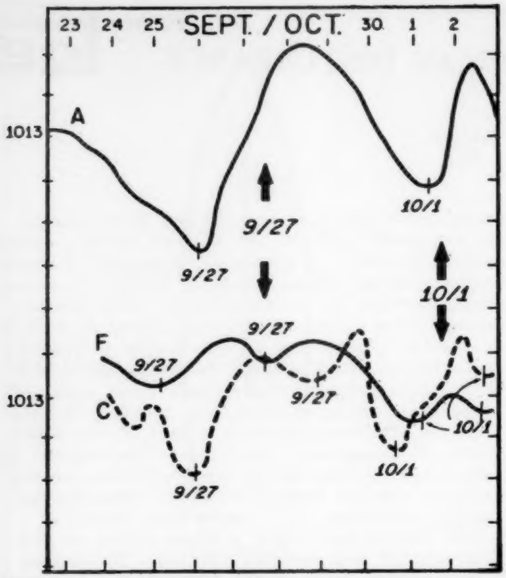


Figure 12.--Barograph traces for selected stations (A, C, F) for a period beginning in late September. (After Toby N. Carlson, 1968, Some Remarks on Africal Disturbances and Their Progress Over the Tropical Atlantic.)

The most frequent range of pressure fluctuations at 17°W was between 3.0-3.9mb. The greatest pressure fluctution was centered near 20°N, near a cyclonic eddy moving with the disturbances at the junction between the dry desert air and the moist air from the south. This vortex has a minimal amount of cloud cover associated with it. It is produced indirectly by the waves' circulation with the formation resulting from the southward motion of warm desert air over a cooler land surface. Near 15°N, the waves are relatively warm in the high troposphere and cold near the surface with the strongest geopotential variation across the wave axis near 600-mb.

The waves move off the African coast where the vorticity as well as the surface convergence are favorable for development. There is a weak inversion layer and the moist air flow stays at a low altitude. This inhibits storm intensification although many of the waves are able to maintain their identity. In William Gray's paper, he discussed the strong influence of the sea-surface temperature on the potential bouyancy of the cumulus clouds. The cumulonimbus is a very important factor for warming the middle and upper troposphere for the development of a tropical weather system. It is important to know the magnitude of the cumulus potential bouyancy. The Atlantic waters near the coast of Africa are affected by a cold water current called the Canary Current (moving down the coast and making a turn to the west in the tropical waters) and the Benguela Current (moving into the Gulf of Guinea), which produce adverse conditions for development. There is a very narrow area of warm water caused by the Equatorial Countercurrent. This aids in the maintenance of the disturbance, until more favorable conditions are attained for development past the Cape Verde Islands.

The African disturbances usually occur in late May or early June, after the easterly jet is established. During the early part of the season, the rate of occurrence is highly variable and the disturbances are weak. The rate of occurrence and intensity of the disturbances increase with the easterly jet becoming stronger and with the increase in monsoonal flow. Dr. Neil Frank's "Atlantic Tropical Systems, 1969" tracking all disturbances from origin have the rate of occurrence reaching a peak in late July. The number of waves passing Dakar at this time is one every 2.5 days. This occurs at the same time the peak of the easterly jet reaches approximately 20 kn. During this period the monsoonal flow reaches its peak with the moist flow reaching its northernmost area of penetration in the region. Toby N. Carlson's analysis discovered that the confluence region of the moist and dry air begins shifting southward with the waves also making a path south of their previous pattern in early September. During this time the desert air begins to cool while the waters in the Gulf of Guinea begin a warming trend. This results in weakening of the easterly jet and the convection makes a major shift toward the equator by the end of September or early October. With these occurrences taking place, the Intertropical Convergence Zone weakens, vertical wind shear increases, and the African disturbances no longer form, with a shift of wave generation to the Caribbean Sea.

I would now like to track the life of an African distrubance that occurred in 1975, using data from the "Atlantic Tropical Systems of 1975," and the Eastern North Pacific and Central North Pacific Tropical Storm summaries. The African wave was first detected over western Africa and passed over Dakar Passage on August 6. It continued westward maintaining a constant forward speed crossing the tropical Atlantic and reaching the Barbados Passage on August 13. There was no further development in this sytem as it continued across the southern Caribbean Sea passing the San Andreas Passage on August 15. The system then crossed into the Pacific, moving westward at about 20 kn. On the 17th, ship reports indicated a weak circulation with light winds. The system then began intensifying and at 0000, August 18, the system became the tenth depression of the Eastern North Pacific, centered at 12.1°N latitude, 95.0°W longitude. The system intensified to storm strength and at 1200 on the 18th was named tropical storm Ilsa, centered at 12.3°N, 97.0°W. The storm continued moving on a west-northwest track at 8 to 10 kn, but the system took a more westerly course as intensification occurred, reaching hurricane intensity at 0000 on the 21st near 14.0°N, 104.0°W, moving with a course of 280° at 9 kn. Intensification continued with a peak intensity of 95 kn at 1200 on the 22d. It maintained this intensity until 0600 on the 25th. Ilsa had been curving toward a northwest track but then turned toward the west again. When weakening began, it was rapid with the system

Table 5.--Eastern North Pacific tropical storm that developed from African seedlings. (After Neil L. Frank, et al. Atlantic Tropical Cyclones, 1969 to 1979.)

Yr.	Storms initiated by African Waves	Total Storms
1969	4	10
1970	11	18
1971	8	18
1972	4	12
1973	7	12
1974	12	17
1975	13	16
1976	13	14
1977	7	8
1978	13	18
1979	7	10
TOTAL	99	153-65%

Table 6.--African systems tracked to the eastern North Pacific. (After Neil L. Frank, et al., Atlantic Tropical Cyclones, 1969 to 1979.)

Yr.	African Systems Tracked to Pacific	Total African Systems
1969	21	58
1970	30	54
1971	38	56
1972	29	57
1973	39	56
1974	32	52
1975	37	61
1976	46	68
1977	49	69
1978	46	63
1979	35	52
TOTAL	402	646
AVG.	36.5	58.7-62%

being downgraded to tropical storm status by 1800 at 20.3°N, 129°W. The system continued in a west-northwest track as a weak low.

In the Central North Pacific near 40°N latitude, an upper-level cold core low drifting westward along the mid-Pacific trough was observed on August 31. To the south-southwest of this system, the remnants of Ilsa were noted to be absorbed into the cold low on September 1. By 0000 on the 2d, the system showed signs of being a well-developed subtropical low with winds estimated to be 35-40 kn. During the day, convection continued to form near the center, which is a tropical characteristic. By 0000 September 3, satellite

Table 7.--Central North Pacific (140°W-180°) tropical cyclones that developed from African seedlings. (After Neil L. Frank, et al., Atlantic Tropical Cyclones, 1973 to 1980.)

Yr.	Cyclones initiated by African Waves	Total Cyclones
1973	1	2
1974	1	3
1975	1	1
1976	3	4
1977	No Cyclones	
1978	8	13
1979	No Cyclones	
1980	1	2
TOTAL	15	25-60%

pictures indicated a tightly wound system with overcast covering the center, classic signs of a cyclone. This tropical development was possible because sea-surface temperatures in the area of the low were in excess of 26°C, reaching a high of 28°C. At 2018 satellite pictures showed a well-developed eye near 39.5°N, 155.5°W. The winds were estimated at 65 kn. The storm moved rapidly northeastward, losing its tropical characteristics and into British Columbia on the 5th, with last detection of the system being to the north of Montana.

This African disturbance traveled approximately 15,000 mi from August 6 to September 5, 1975, and became the first known case of a hurricane forming north of the Hawaiian Islands. This was a very rare event which attests to the potential of these systems for forming into hurricanes. These African systems are noted to be the source of over 60 percent of Eastern Pacific storms, 50 percent of Atlantic storms, and every major hurricane to hit the United States since 1965. From "Tropical Cyclones of the North Atlantic Ocean, 1871-1980," it is noted that all hurricanes to hit the United States that were Level 3 or higher, over 50 percent could have possibly been formed from African disturbances (tables 5-7).

There was a statement made in the "Atlantic Tropical Systems of 1976" that there is one major hurricane a year in September east of the Antilles spawned by an African disturbance. The African disturbance has been recognized as one of the major tropical weather systems since satellite data has improved the tracking of these systems and their effects on tropical cyclone origin in the Atlantic and Eastern Pacific Oceans.

For a list of references contact the author.

EXTREME STORM WAVES AND TYPHOON FAYE

Jerome W. Nickerson
Marine Observations Program
National Weather Service
Silver Spring, MD

Captain G. J. Cordes, Master of the S.S. MOBILE, a SEA-LAND container ship, has been kind enough to share his experiences with both extreme storm waves and typhoon Faye with us. For simplicity, all times will be local, except on the barogram and as noted on the chart (lower times of typhoon position are local). Below is a summary of Captain Cordes' account of his voyage from Kaoshing, Taiwan, to the U.S. Naval Base, Subic Bay, Philippine Islands.

The MOBILE departed Kaoshing at 0742 on August 23, 1982, for Subic Bay. A full profile of containers was aboard with truck chassis in bundles of two lashed on top of the containers on hatches No. 1, No. 2, and No. 9. Wooden 4x4's were laid across the tops of the containers to distribute the load of the chassis.

The S.S. MOBILE proceeded along the west coast of Luzon which reduced the general height of the sea from the easterly wind. The weather broadcast from Hong Kong located typhoon Faye at about 13°N and 118°E at 0500 on August 24, 1983, and forecast it to remain essentially stationary for the next 24 hr. There was no evidence of the typhoon other than a slowly increasing southerly swell.

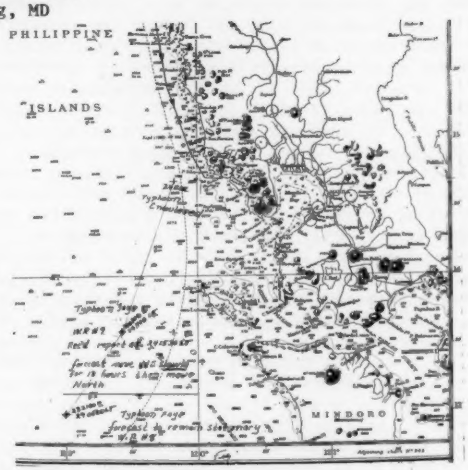


Figure 13.-- The MOBILE's intended course and actual positions (LT) are shown in the upper center. Typhoon Faye approached from the lower left and was encountered off Subic Bay.

EXTREME STORM WAVE: At 1500 on August 24 the ship was struck by an extreme storm wave. The ship pitched steeply down into the trough ahead of the wave, slammed into the wave, and pitched upward rapidly. When the wave passed under the stern, the MOBILE was again slammed into the sea. After a short period of violent pitching, the ship began to ride normally again. This occurred at 15°09'N, 119°52'E as shown on the chart (fig. 13). A container on hatch No. 1 burst open and some of the mail bags were washed over the side when the extreme wave came aboard (fig. 14).

A contributing factor to the damage was the large moment arm of the heavy chassis on the top of the containers well forward of the ship's center of movement. When the violent pitching and slamming occurred, the chassis became like huge hammers.

At about 1600 the Military Sealift Command at Subic Bay was contacted for the latest weather forecast. Typhoon Faye's position was the same. It was expected to pass Subic 60-70 mi to the west at its closest point of approach (C.P.A.) at about 2300. Captain Cordes reduced speed so he could better react to any other extreme waves that might be coming and proceeded on course to Subic, anticipating arrival about 1900, well ahead of the typhoon.

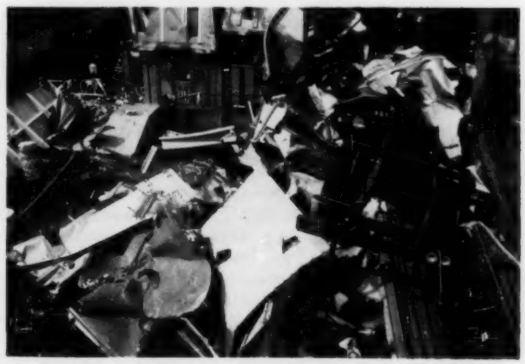


Figure 14.-- Damaged containers and truck chassis on No. 1 hatch looking aft from the bow and slightly starboard.

TYPHOON FAYE: At 1630 the weather was good, light overcast of the usual monsoon type, the wind was east-northeast at 10-15 kn, and there was a moderate southerly swell. By 1700 the wind had increased to 50 kn and an ominous line of low, dark clouds appeared on the horizon ahead. Typhoon Faye had not been stationary at all, but had continued to move northeastward at about 15-20 kn since the morning report.

It was fortunate that the wind was from the east because the MOBILE was only 3 mi west of Capones Island. A westerly course was tried to get the ship away from land in anticipation of

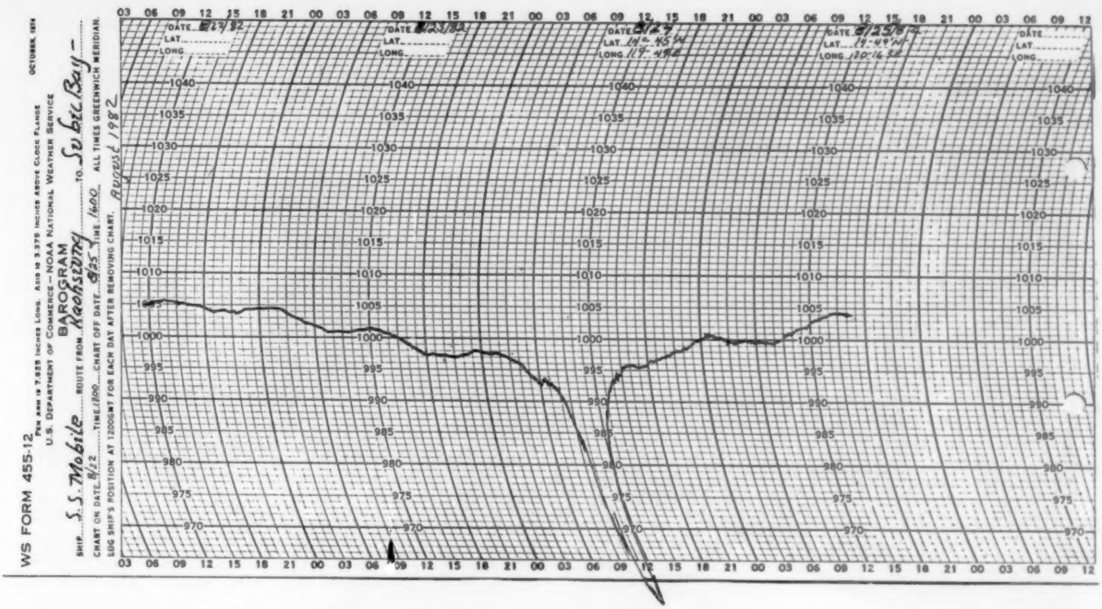


Figure 15.-- The barograph trace as the MOBILE passed through the eye of typhoon Faye. The barograph may be reset to prevent the pen from running off the chart but the crew was probably to busy running the ship..

the wind reversing directions on the opposite side of the typhoon eye.

At 1730, the wind was from the east at more than 60 kn and the barometer was dropping precipitously as shown in figure 14 (Z + 8 = LT). The ship would not hold a westerly course in the wind and high sea and swell. The ship's head fell off to the southwest, and at 1805 maximum speed was needed to hold the southwesterly course. A fully loaded container ship in a storm has all of the attributes of a square rigged sailing ship with all sails set. Blinding rain reduced visibility to zero and made the radars ineffective.

By 1830, the windspeed had increased to a steady 80-90 kn with gusts estimated at 100 kn. However, the ship was now riding well with wind and sea on the stern. Speed was cautiously reduced to the minimum for steerage. Both radar antennas refused to turn in the high wind.

At about 1945 (1145Z) MOBILE entered the eye of the typhoon (fig. 15). One radar began functioning and the eye could be clearly seen encircling the ship, but the heavy rain of the storm attenuated the radar so that targets beyond the eyewall could not be detected. The LORAN C gave a reasonable fix (within 5-6 mi in this area). To avoid any chance of grounding, it was decided to maintain the southwesterly course. The position of the eye of the typhoon was transmitted to Hong Kong and they responded with typhoon advisory No. 12 relocating typhoon Faye. At about the same time the S.S. PRESIDENT POLK, 20 mi to the northeast reported 80-kn winds.

At about 2030 MOBILE entered the southern wall of the eye. The wind jumped to an average steady wind of 80-90 kn with gusts well over 100 kn. Spray and torrential rain reduced visibility to near zero. Seas were mountainous. The radar ceased functioning again as the wind increased. Many of the ship's parts and fittings could be seen blowing away or bending in the wind with water coming across the ship (figs. 16 and 17). The masthead and range lights were lost around 2045. Finally, the storm began to decrease about 2130 with wind under 50 kn and, for the remainder of the night, the wind gradually decreased.

The following is a list of the damages.

- 6 chassis lost overboard
- 4 chassis damaged
- 4 containers destroyed on No. 1 hatch
- 8 containers on No. 2 hatch damaged
- Both masthead and range lights destroyed
- H.F. radio antenna bent back 45 degrees
- All wire antenna destroyed
- Both cranes inoperative
- Anchor windlass controller sheered off at deck
- Vent pipe sheered off allowing bosun's stores over No. 2 deeptank to flood with 3 ft of water.

COMMENTS

There are many things to be learned from reading about experiences like this. Please contact your PMO or send your narratives to me.

Figure 16.-- The damaged containers and truck chassis on No. 2 hatch with those on No. 1 hatch in the foreground. The view is from the bow looking slightly to port.

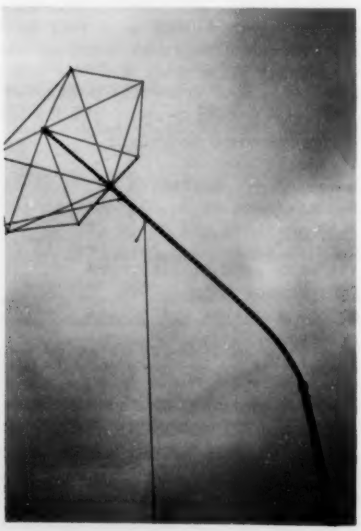


Figure 17.--Main high frequency antenna bent back 45 degrees by the force of the storm.

From this story we learned:

- That the swell extend far ahead of storms and may include extreme waves.
- That hurricanes and typhoons should be given the same respect as a poisonous snake -- never get close enough for it to strike.
- That once the storm has your ship, the options of choosing course and speed may be denied you.

We wish to thank Captain Cordes for his narrative. We have sent him a list of additional questions that will help us define the characteristics of the extreme waves that the MOBILE encountered.

Hints to the Observer

Beginning with this issue "Hints to the Observer" will be combined with "Marine Observations Program".

Marine Observations Program

Jerome W. Nickerson
National Weather Service
Silver Spring, MD

INTERNATIONAL VESSEL WEATHER NETWORK

The Marine Observations Program is international in scope; in fact, half the ships in the United States Cooperative Ship Program do not fly the U.S. flag. That is as it should be. Our weather forecasts are for all mariners and the weather reports from all vessels provide the necessary information for the forecasts. In the international marine weather community, there is no competition, only mutual support. Weather reports from vessels in the U.S. weather forecast areas (WMO Region IV) are transmitted immediately to Asia and Europe over the Global Telecommunications System (GTS). So a German ship, for instance, reporting weather to the U.S. Coast Guard Radio Station at Portsmouth, Va., should know that his weather report will also be received in Germany over the GTS. There is also an exchange of climatological data internationally so that the weather record data mailed to a U.S. Port Meteorological Officer (PMO) on the "Ship's Weather Observations," NOAA Form 72-1A is made available worldwide. Ship observers should not send duplicate weather records to two countries.

INTERNATIONAL ECONOMY AND SHIP WEATHER REPORTS

Some people look at the stock market to judge the state of the economy, but we can tell from the number and quality of the weather observations and reports from vessels. The Journal of Commerce reports company failures and belt-tightenings have resulted in 12% of the world's shipping tonnage being laid up.

To increase the number of ships reporting, particularly the 1200Z reports in the eastern Pacific, we made an appeal for more reports in this magazine and others. We also reprogrammed funds to open up that area for INMARSAT satellite communications. Even though only 60 ships were contacted by INMARSAT, we have had an improved response from both conventional radio and INMARSAT equipped ships. We have also mailed an invitation to the other 1,400 ships with INMARSAT as many are not listed in the U.S. Cooperative Ship Program data base. We expect a response from these in January and February. For you who have made the extra effort to get the nighttime weather reports to us, your efforts have been noticed with great appreciation.

Why are the 00Z and 12Z observations so important? These are the two times when the upper air soundings are made. These data are combined with ship and buoy weather reports in the National Meteorological Center computer to provide forecaster guidance products. The forecaster uses these guidance products as an aid together with the map of plotted and analyzed ship reports in making decisions on the forecast.

As you can see from figure 18, marine observations reached a low in Feburary 1982. However, the general trend is now upward--keep up the good work!

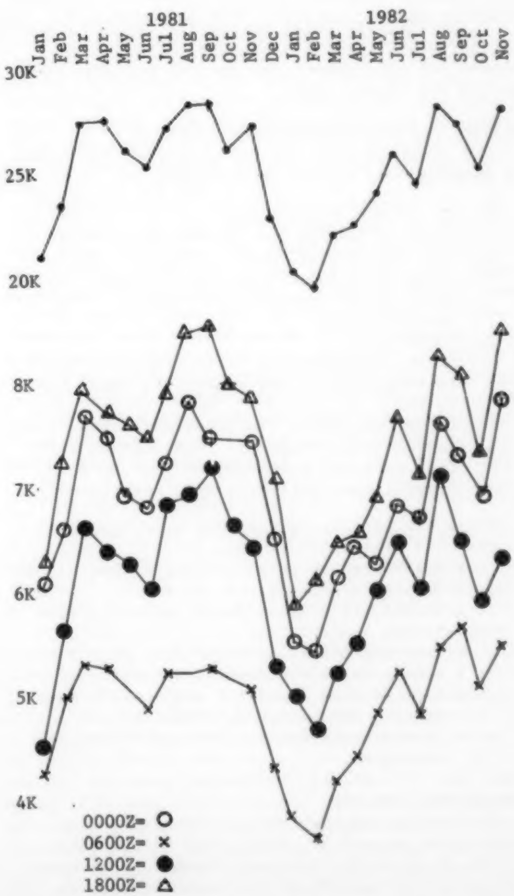


Figure 19. Ship weather reports received by month and by synoptic map time.

INMARSAT WEATHER REPORTS FROM SHIPS IN THE ATLANTIC AND PACIFIC

In order to allow the ship radio officers more flexibility and also guarantee that the weather report can be transmitted from the ships as a priority message, the National Weather Service has agreed to accept weather messages in a limited area by INMARSAT. This area is the WMO Region IV which may be simplified to read:

- In the Pacific, the area includes from the Equator northward and from the dateline (180°) eastward to the coast of North America. This line is extended westward along the Aleutian Islands to 50°N, 167°E, thence northeastward to Diomede Island in the Bering Strait so that the area includes the Aleutian Islands and the Bering Sea.
- In the Atlantic, the area includes from the Equator northward and from 35°W westward to the coastline of North America. The area also includes the Gulf of Mexico and the Caribbean Sea.

The INMARSAT telex number for weather reports is 230 89406. There is no cost to the ship. Please use this number for weather messages only and in the proper area.

WEATHER MESSAGE TRANSMISSION PRIORITY

The order of priority for selecting the means of sending ship weather reports is:

1. U.S. Coast Guard SITOR
   (free of charge and transmission errors)
2. U.S. Coast Guard radio telegraph (CW)
   (free of charge, sometimes messages delayed waiting for receiver, atmospheric interference)
3. INMARSAT
   (fast, transmission error free, no charge to ship when in WMO Region IV, small cost to NWS)
4. Commercial radio (Intended as backup, same static and atmospheric interference problems as Coast Guard CW, no cost to ship, highest cost method to NWS, restricted*)

* Restrictions to commercial radio messages:

- Restricted to primary synoptic hours: 00Z, 06Z, 12Z, and 18Z.
- Should try 2 Coast Guard radio stations first.
- Time limited to synoptic hour plus 3 hr.
- Send only current weather report.
- Include Form 72-4A (or copy) with "Ship's Weather Observations," NOAA Form 72-1A.
- No restrictions on SPREP and STORM messages.

PMO KENNEDY RETIRES

William E. Kennedy, PMO at Cleveland, Ohio, retired on January 31, 1983. Mr. Kennedy has served 42 yr in the National Weather Service and the last 30 yr as PMO on the Great Lakes. In addition to starting the PMO program on the Lakes, he introduced many innovative procedures and improvements during his career. The Great Lakes and the Marine Observations Program will greatly miss his dedication and experience.

PORT STUDY UNDERWAY

The United States has over 100 ports. Of these there are about 20 that could be classed as major ports, possibly requiring a PMO to assure service to the weather observers on the many commercial ships in our Cooperative Ship Program. This study will indicate the ports that statistically need PMOs. We are looking at 50 of these ports in this study. Comments are always welcome.

SCHOOL DAYS

One of the PMO's tasks is to support maritime schools so it seemed appropriate that I have first-hand experience. With the assistance of various marine forecasters from the Washington, D.C. Ocean Service Unit, we teach an all-day session in marine observations with forecast applications. Actually, it is more of a forum than a class as we are also there to learn from the mariners. Some of the major items discussed were:

<u>General</u>--Some ships still do not have the new code. Any ship that does not have material dated 1-82 should contact their servicing PMO or write me.

Most of the earlier questions could have been answered by reading Chapter 1 of the "National Weather Service Observing Handbook No. 1" (NWSOH No. 1). We were very surprised at how easy and comfortable it was to discuss topics at length in class, but how few gripes were received on the comment sheet on the back of the "Ship's Weather Observations," NOAA Form 72-1A. It would make everyone's job easier if there was a better exchange of ideas and questions via the 72-1A. The gripe sheets are sent to the Marine Observations Program Office by the PMOs when they review the 72-1A. We channel them to the appropriate person or group to get things done. We have also established contact with a focal point for Coast Guard communications gripes at Governors Island, N.Y. They are working on the CW problems that you have passed on. They, as all of us, take these gripes as a serious matter to be solved as quickly as possible.

How can you help? Every time you see something wrong, or question if it couldn't be made to work better, write it out on the back of the 72-1A. Give as many details as possible so we can get right at the problem. The back of the 72-1A is laid out as a <u>suggested</u> form; use it for any message, suggestion, or comment you would like to pass on. We even received a hand-drawn Christmas card last year on a 72-1A.

There are prevalent misunderstandings about the forms and the code. Most of the code questions are answered in the NWSOH No. 1. May I suggest that you look at your ship's schedule and set up a briefing with any PMO at some future port call. You can do this by writing him a letter or telephoning the local Weather Service Office to request they contact a PMO. Some are listed on page 1-16 and 1-17 of the NWSOH No. 1. The prob-

lems disappeared when we went through the NWSOH No. 1 together with the mariners.

Ship's Weather Observations, Form 72-1A--The perforations are under the black end binder tape. Bend the cover back to the staples and the sheets will tear out more easily.

The heading block at the top of each page must be completed. These form sheets are handled by many people during their routing through the PMO and on to the National Climatic Data Center (NCDC). Once they are in stacks of a couple thousand sheets there is no way to identify the form without the information in the heading block. If the PMO doesn't fill it in for you and a sheet with a blank heading block reaches NCDC, it, regrettably, is thrown away because most of this data is needed to properly store and retrieve the sheet.

On the back, only the first or last sheet is required to be completed. This data is to verify our mailing address files for such things as this magazine. Normal voyage routing is to verify that you have the correct servicing PMO.

Most Frequent Observation Errors--The 72-1A and 72-4A forms are like a catalog. Only the call sign and the first five groups are mandatory (thatis through Nddff (2-5)). Group 222 D_sv_s is also mandatory if there are marine data following that group (2-5). This is because the group numbers are repeated after this group. The number in parentheses refers to the page numbers in the NWSOH No. 1. Some of the most frequent errors are:

SPREP or STORM prefixes (1-9) not used when the weather report indicates they should have been used.

Weather group indicator i_x (2-13) mismatched with weather group.

Weather group reported when weather is not significant (2-77 and 2-93).

Sea-surface temperature included in radio report when intake is below 10 m (2-115, 2-116, and 2-117). Using a "0" instead of a "/" when the intake temperature can't be read to an accuracy of 1/10 degree C.

The waves reported in 2PwPwHwHw are the significant waves, or the average of the highest one-third (2-119). Over years of study it has been found that this is what the mariner sees and reports in a seaway. The average wave is what is recorded by wave measuring devices. The relationship between wave heights are:

WAVE	RELATIVE HEIGHT
Average	0.64
Significant	1.00
Highest	1.87
Extreme (approx.)	2.3-2.5

Groups 3, 4, and 5 refer to swell. If there is no distinguishable swell do not fill in these groups.

The table 2.10, "True Direction in Tens of Degrees" (2-126) is used in several places in the NWSOH No. 1. On this page the "00" and "Calm" should be crossed out.

Again, except for the mandatory groups, there is no need to report any group, or element within a group, that is not significant. Atmospheric pressure is always considered significant.

SERVICING PMO

Your servicing PMO is the PMO that reviews your 72-1A's and mails them to NCDC. He sees to it that you are properly supplied with all the materials you need to make observations. If you have problems, he is responsible for your training. Any of these things can be done by any PMO (except receive your 72-1A's), but only your servicing PMO has the responsibility to see that it is done.

SAFETY AND PROFIT

When we got down through the polite icing on the question, "Why does your ship make weather observations?", there remained--the ship and crew safety, and profit. When a ship weather report is received it is plotted on a weather map. It provides a more complete picture of the weather situation and a better forecast. From the forecast, your ship may be able to adjust course to avoid a storm, gales, or high waves. Incidentally, commercial meteorologists and ship routers depend upon the National Weather Service (NWS) for almost all of their ship weather reports. They all have access to the data at the same time as the NWS forecasters.

Profit--whether you do it yourself or hire a ship router, you and your company want to get your ship, its crew, and cargo from port A to port B without damage to the ship, crew, or cargo as economically as possible. Without ship weather reports neither you, the NWS forecaster, nor the commercial ship router can do a good job. In today's economical situation, too many poor jobs of weather forecasting and/or ship routing because of the lack of enough ship reports can make a company noncompetitive and you could lose your job. I see this as a very strong profit motive for making ship weather reports.

EXTREME WAVES AND CLOSET DOORS

As said in the Summer 1982, Volume 26, Number 3, Mariners Weather Log, we don't like the name "Freak" because it is an incorrect description. "Special" lacked zip and wasn't very descriptive. We think "Extreme" should satisfy everyone.

This has been a "closet" subject for research since the days of the Phoenicians because the phenomena are rare and the data is usually subjective with only a few cases of actual measurement. Now that we have opened the closet door a little, there are a lot more experiences than we had originally thought. You can help us by sending whatever meteorological data you may have along with your narrative. If you send photographic material, please include a statement that you are releasing the photographs for publication and let us know if you want them back. (See the extreme wave article in this issue furnished by Captain Cordes, S.S. MOBILE).

Tips to the Radio Officer

Thomas H. Reppert
National Weather Service, NOAA
Silver Spring, Md.

On January 1, 1983, the weather segments were discontinued on the National Bureau of Standards radio station WWV. For several years problems were experienced in relaying high-quality taped weather messages from the Washington, DC, forecast office to the broadcast site at Fort Collins, Colo. Finally, the technical problems along with increased operating costs forced the discontinuation of the program.

The weather segments were broadcast in three 40-s time slots at 8, 9, and 10 min past the hour and provided brief information on storm centers and areas of gale-force winds. Because of the severe time constraints, the WWV broadcast played a secondary role as a back-up service to the detailed marine weather broadcasts made by the Coast Guard and commercial marine radio stations.

The Pacific segment of the WWV broadcast (east of 140°W) is now carried on station WWVH at 51 min past the hour. Together with the 48, 49, and 50 min slots, full coverage of the Pacific area remains intact. On the east coast, Selected Worldwide Marine Weather Broadcasts lists 27 broadcast stations (in addition to NOAA Weather Radio) that provide Atlantic coverage.

For many, including hobbyists and yachtsmen, the loss of WWV weather is like losing an old friend. But the Coast Guard and other broadcasts, as well as increased radiofacsimile coverage, more than fill the gap. If the WWV broadcast was filling a specific marine weather need not duplicated by the primary marine broadcasts, please contact:

National Weather Service-NOAA
W/OM12
Silver Spring, MD 20910

The September 1982 edition of Selected Worldwide Marine Weather Broadcasts has been printed and distributed to vessels participating in the Cooperative Ship Program. Sales to the public are available from Superintendent of Documents, U.S. Government Printing Office, Washington, DC. Please refer to the stock number, 013-018-81001-8, when ordering.

The Editor's Desk

HURRICANE HAVENS

The Hurricane Havens Handbook for the North Atlantic Ocean was published as NEPRF Technical Report TR 82-03 in June 1982. This first edition included detailed assessments of the nine ports listed in table 8, and a comprehensive General Guidance section designed to assist ships at all Atlantic ports and at sea.

Current plans envision publication of the next seven port studies in early 1983 as Change One to the first edition, with the remaining six port assessments to follow approximately 18 mo later as Change Two.

Distribution of the first edition included all operational units of the U.S. Atlantic Fleet, U.S. Coast Guard units along the Atlantic and Gulf of Mexico Coasts, and National Weather Service offices with maritime forecasting responsibilities. Outside the operational sphere, many government agencies and universities with research interests in this field also received copies.

The design of the Hurricane Havens Handbook is similar to that of a 1976 NEPRF publication, Typhoon Havens Handbook for the Western Pacific and Indian Oceans (TP 5-76), which was developed to serve the needs of the Pacific Fleet. The art has evolved since then, however, and the content of the Hurricane Havens Handbook has been influenced by three factors: (1) The majority of ports earmarked for study in the Atlantic possess little topographical shelter; (2) Most of the ports are located shorewards of a broad, shallow, continental shelf; and (3) A much larger and more detailed data base on the impact of tropical cyclones in terms of wind, wave, and tidal effects is available for the North Atlantic than for the west Pacific. (Furthermore, these data have already been subject to considerable analysis.)

As a consequence of these three influences, the Hurricane Havens Handbook places more emphasis on providing local guidelines for distinguishing between 'serious' and 'relatively trivial' tropical cyclone threats on the basis of both climatological and real-time forecast information, with stress on geophysical effects on the hurricane's impact. In addition, special attention has been paid to the shiplifting capabilities of storm surge.

The availability of a large and well-researched North Atlantic data base supported substantial enlargement of the General Guidance section in the Hurricane Havens Handbook: it now also includes details of the latest additions to the tropical cyclone warning and forecast services, such as the Navy Wind and Strike Probability Forecast program.

One example of the use of this expanded data base appears in figure 19, which shows certain aspects of the hurricane haven potential of any location along the Atlantic and Gulf Coasts.

Such a generalized view is based on identifying three elements in the hurricane threat to ships in harbor that can be represented as continuously

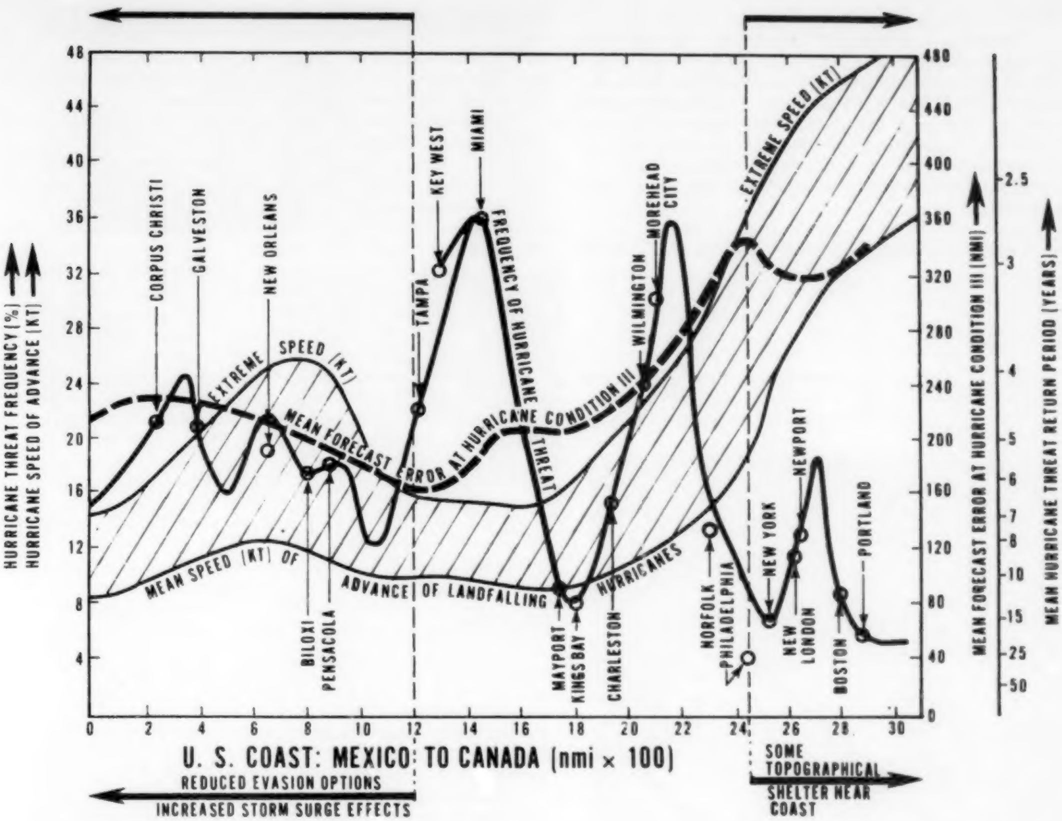


Figure 19.-- Variations in factors that govern the potential for finding hurricane havens along the U.S. Gulf and Atlantic coasts from Mexico to Canada (from the Hurricane Havens Handbook).

variable quantities from the Mexican border to the Canadian border: (1) The frequency of hurricane landfall along the coast; (2) the likely error in the real-time forecast at 48 hours ahead of possible landfall; and (3) the mean and extreme speeds of advance of hurricanes in that region of the coast.

These three elements perhaps can be expressed more colloquially as: (1) The likelihood of getting hit in harbor; (2) the chances of being misled by the current forecast; and (3) the risk of being overrun by a hurricane at sea if it is decided to leave harbor.

Two additional factors depicted in figure 19 include the existence of some topographical shelter toward the northeastern limit of the U.S. coastline, and the special problems of reduced evasion options and exceptional impact of storm surge along the Gulf coast.

One particular by-product of storm surge that can have dire operational consequences for Navy vessels, and equally serious economic consequences for merchant vessels, is the surge's ability to produce sudden shoaling of dredged harbor approach channels to the extent that vessels may be trapped in harbor for several weeks. This problem is created by rather specialized, localized circumstances: For example, Gulfport, Miss., is susceptible to this shoaling while Pensacola, Fla., which is only 60 mi to the east, is not.

Some broad principles have emerged from the Hurricane Havens studies:

... Direct landfalling hurricanes are considerably more destructive to ships in harbor than storms that parallel the coast close inshore or that approach overland. (A large number of sorties from essentially poor hurricane havens can be eliminated by considering this principle; specific guidance is included in the port evaluations where possible.)

... Alongside berthing of ships in harbor poses the greatest number of problems in countering the effects of a hurricane. Steaming at anchor or mooring set in good holding ground, water sheltered at least from open ocean swell, is the safest countermeasure unless there is a threat of damage from drifting hulks.

... Errors in tropical cyclone forecast movement are so large that evasion at sea can be safely executed only if the ship is prepared to sortie from a threatened harbor well before it is absolutely certain that such action is really

necessary.

... Deep-water river ports capable of harboring ocean-going vessels may be acceptable as hurricane havens if they are located well inland. Even ports such as Philadelphia, Pa., may be acceptable insofar as they are free from destructive hurricane weather effects. However, the possibility that approach channels may remain closed for some weeks after a hurricane strike must be considered.

SHUTTLE IMAGING RADAR DISCOVERS HIDDEN FEATURES IN SAHARA

The Shuttle Imaging Radar-A (SIR-A), flown on the second test flight of the Shuttle, November 1981, penetrated the extremely dry Selima Sand Sheet in the eastern Sahara Desert (just north of the border of Egypt, the Sudan and Chad) to reveal previously unknown river channels, geologic structures and possible Stone Age occupation sites (fig. 20).

Figure 20.--A strip of the Shuttle Imaging Radar-A superimposed over Landsat imagery showing the ancient channels and geological structures. NASA Photo.

The radar signal was able to penetrate the sand dunes, drift sand and alluvium-filled valleys of the Arabian Desert to reveal bedrock and gravel subsurface features. Some of the subsurface features are nearly as broad as the Nile River Valley and could perhaps be as old as the Early Tertiary period (up to 50 million years ago).

The now-vanished major river systems which carved these large prehistoric valleys probably accomplished most of the erosional stripping which occurred in this now extraordinarily flat and hyperarid region. There is even evidence of intermittent running water during the Quaternary pluvial period (during the last million years).

The presence of old drainage networks, originally detected in the radar images and confirmed with special post-flight ground geoarchaeological studies of the region, suggest an explanation for the location of many playas and present-day oasis in the Arabian Desert. These same oasis areas have been the center of episodic human habitation and in fact may have influenced habitation patterns within historic time.

The average depth of the radar signal sand penetration, based on laboratory and field studies, varies locally from 1 to 5 meters. The penetration of dry sand by imaging radar can now provide a new tool for geoarchaeology and for the search for ground water and other resources in arid and hyperarid regions.

The Arabian desert region situated in southwestern Egypt and northern Sudan, is known to have supported human habitation during several periods from about 200,000 to 40,000 yr ago with some reoccupation as recent as 10,000 yr ago.

These Quaternary period occupations are believed to be coincident with the pluvial conditions which periodically changed the desert region to, at best, a savanna-like environment allowing small streams and playa lakes to exist.

By about 5,000 yr ago hyperaridity again set in and the region was abandoned by humans.

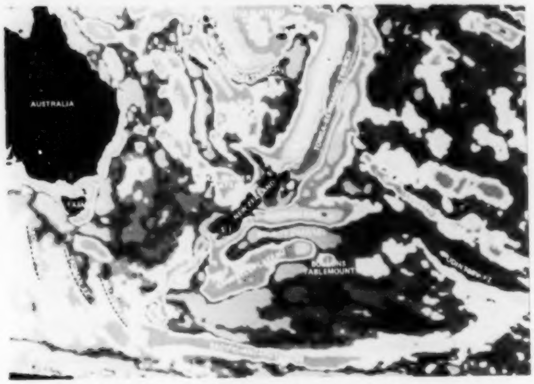
The sand sheet is virtually featureless, consisting of hundreds of kilometers of almost completely flat terrain composed of coarse sand and fine pebbles. This windblown sand cover overlies alluvial soils dated to about 8,500 yr ago. The radar pictures show a completely different type of terrain underlying the sand sheet. The subsurface contains numerous river valleys and associated tributaries which were known previously only to the Neolithic and Paleolithic people and possibly early human ancestors who inhabited the area during its wet periods.

The results of the radar imaging experiment will be useful in interpreting the history of the various drainage basins which have developed, dried up and evolved in this region of the Middle East. At least four precursor river systems predate the present Nile River. Much of the earlier drainage patterns has been lost because of geologic evolution or weathering, but the indications from the Shuttle radar images point positively towards being able to reconstruct at least some of the prehistoric drainage systems.

As an example, some of the river drainage patterns discerned in the radar images flow opposite to the present day Nile system. These prehistoric systems could date as far back as the Tertiary Period (up to 65 million yr ago). This paleogeology will be further assisted by future Shuttle radar flights now being planned.

The radar images have also revealed a series of semirectangular features that may be agricultural fields of pastoral sites, which are similar in form and scale to pre-Hispanic sunken-field groundwater-skimming agricultural features in the coastal desert regions of Peru. Because of the similarity between the Egyptian sites and the Peruvian fields, this may represent previously unrecognized pastoral or agricultural sites in southern Egypt.

Previous to these discoveries the potential for subsurface radar imaging had been discussed but very little work had actually been under-



Figures 21 & 22.-- SEASAT images of the ocean floor by measuring the topography of the sea surface.with SEASATs altimeter.

taken. Radar penetration is theoretically possible under a very limited range of conditions which are a function of the characteristics of the radar system and the local ground surface. The surface of the ground should be extremely smooth, thus allowing the radar signal to enter the ground rather than to break up and backscatter away from the radar's antenna.

The ground electrical characteristics should also be virtually transparent to the radar signal, dessicated sand being a very good example, wet clay soil being a bad example.

The angle the radar signal strikes the ground is also important as is the wavelength and the power. The radar signal is attenuated as it passes through the sand, both on the downward journey and the return upward journey. The type of underlying material, the degree of backscatter, the reflection angle and polarization are all important characteristics associated with this subsurface radar imaging.

The physics involved are not yet thoroughly defined. Based on the Shuttle radar results, laboratory studies to better define the theory and practical applications of this are underway.

SATELLITE IMAGES REVEAL NEW OCEAN FEATURES

Major geologic features on the ocean floor are shown in images recently produced from data collected by the SEASAT oceanographic satellite, flown by NASA in 1978 (figs. 21 and 22). Each image represents a global snapshot of sea floor characteristics never before available and at least one previously unknown feature is revealed. The images were made by measuring the topography of the ocean surface with the satellite's altimeter. The global image is comprised of more than 50 million physical measurements including 10 corrections for atmospheric and other interferences. They were produced from the same data, but each was processed differently to emphasize a unique set of features.

The images supply new, detailed bathymetric (water depth) and geologic information for wide areas of the world's seas. This is especially true in the southern oceans which have been poorly surveyed. Existing bathymetric charts show the Louisville Ridge as a discontinuous chain of mountains running southeast of the Tonga-Kermadic Trench. The SEASAT image of this region clearly shows a nearly continuous chain of features.

SEASAT collected 70 days of oceanographic data over a 100 day period. The radar altimeter measured the distance from the spacecraft to the ocean surface. By calculating the satellite's position, and correcting for passage of the radar beam through the atmosphere, the height of the ocean surface, relative to a reference ellipsoid was determined.

The resulting maps, which show the ocean surface at one-half degree resolution, were created through computer processing of the SEASAT altimeter data. They are designed to emphasize features on the ocean floor ranging in size from 50 to 500 km.

Mapping the sea floor by measuring the sea surface topography is possible because of the relationship between gravity, the sea floor, and the ocean. Gravity over the Earth is not constant and varies depending on the local thickness, density, age, and geology of the crust.

The ocean conforms to variations in this uneven gravity field because it is a fluid. Sea surface topography dominantly conforms to the sea floor topography. A mountainous formation on the sea floor, for example, causes a peak on the ocean surface detectable by a satellite altimeter.

NASA is considering a follow-on mission called Topography Experiment for Ocean Circulation, TOPEX, to study the ocean's circulation with a high resolution satellite altimeter.

SEASAT is managed for NASA by JPL. Production and analysis of the altimeter maps were sponsored by the Oceanic Processes Branch in NASA's Office of Space Science and Applications.

IMPROVED FORECASTING FOR FISHERMEN

A marine weather-reporting project underway at Coos Bay, Oreg. promises to bring improved weather forecasts for commercial fishermen and other boaters who use Oregon's coastal waters.

A ship-to-shore radio service at Coos Bay's Charleston Boat Basin is set up to receive periodic reports of offshore weather conditions from fishermen and other mariners who volunteer to participate in the project.

The reports are collected and forwarded to the National Weather Service (NWS) in Portland for use in weather analysis and forecasting. The reports also go to NWS offices in Eugene, Astoria, Seattle, and San Francisco to provide an early warning system for unexpectedly severe weather

that could be hazardous to vessels.

The project is a cooperative effort of the NWS, the Port of Coos Bay and the Oregon State University Sea Grant program.

Although the NWS obtains reliable data from satellites and weather buoys about general weather patterns, direct information about ocean surface weather conditions, which often change rapidly and vary over short areas, has rarely been available.

Fishermen in Oregon and northern California are being encouraged to participate in the project. They will be expected to report on wind speed and direction, wave height, sea and air temperatures, visibility, and any unusual weather events.

Reporting times are 6 a.m. to 7 a.m., noon to 1 p.m., 6 p.m. to 7 p.m., and midnight to 1 a.m., all Pacific Daylight Time. Reports are made on VHF Channel 12 and single-sideband Channel 4 Baker (4143.6 MHz).

Information on how to participate in the weather reporting project can be obtained from OSU marine advisory agents in Clatsop, Tillamook, Lincoln, Coos and Curry counties. In northern California, contact the area marine extension advisor in Crescent City.

HURRICANE DEBBY PROVIDES RESEARCH ADVANCES

As a hurricane, the September storm Debby barely made the grade, but NOAA scientists consider it memorable.

During Debby's life as an Atlantic hurricane from September 14 to 19, NOAA scientists demonstrated that Doppler radar can be used in aircraft, and that instrument packages parachuted into the storm's path can provide forecasters a wide range of data almost instantly.

Temperature, humidity, wind and pressure readings were sent from the descending dropwindsondes to NOAA's National Hurricane Center and National Meteorological Center for use in tracking the hurricane and evaluating its nearby environment, according to Stanley L. Rosenthal, director of the National Hurricane Research Laboratory in Coral Gables, Fla. Readings were radioed back to the plane, entered into onboard computers and transmitted to both weather facilities.

The volume of usable information exceeded expectations as the sensors were dropped at 100 mi intervals surrounding the storm from two NOAA research aircraft. The information was incorporated into forecasts at the National Hurricane Center and combined with other global weather data for computer-prepared guidance to National Weather Service offices at the National Meteorological Center in Suitland, Md.

Scientists, for the first time, used Doppler radar from aircraft during Debby, overcoming vibration and antenna stabilization problems some had considered insuperable. Doppler radar measures windspeeds moving toward and away from it, and is highly regarded as a tool for probing thunderstorms for possible tornado development. The ability to use aircraft as a Doppler platform will allow more precise information on hurricane wind fields to be quickly obtained.

MAJOR METALLIC MINERAL FIND ON ATLANTIC OCEAN FLOOR

The largest deposit of valuable metallic minerals ever found on a slow-spreading ocean ridge has been discovered 10,000 ft below the surface of the Atlantic, 1,800 mi east of Miami (fig. 23).

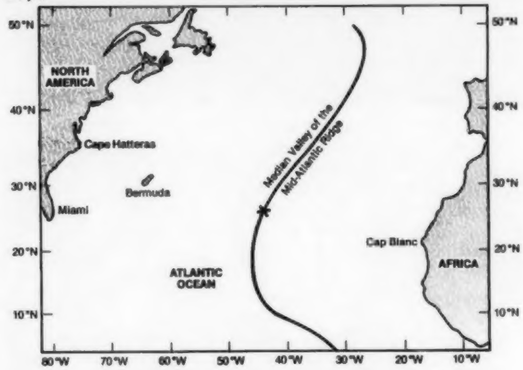


Figure 23.-- The site (X) on the mid-Atlantic ridge of the largest metallic mineral deposits found on a slow-spreading oceanic ridge.

It is rich in manganese, a strategic material for which the U.S. depends wholly upon imports, and large deposits containing copper, zinc, and silver may lie under it, according to a team of oceanographers who investigated the area in July 1982.

The group included Peter Rona of NOAA, chief scientist, Geoffrey Thompson, Michael Mottl, and Jeffrey Karson of Woods Hole Oceanographic Institution; and Karen Von Damm of the Massachusetts Institute of Technology. The expedition, which used the submersible ALVIN, was jointly funded by NOAA and the National Science Foundation.

Intermittent deposits were found in an area 2 mi long and a mile wide on the wall of the rift valley of the mid-Atlantic Ridge, a volcanic mountain range running down the middle of the ocean. The largest single deposit was about 200 ft wide and 50 ft high.

The find opens the prospect for similar deposits along the 10,000-mi mid-Atlantic Ridge. It will help scientists determine how similar land deposits were formed, and possibly lead to land-based discoveries. The deposits are also a resource for possible future recovery.

The deposits on the rift valley wall were described as composed of black, orange, and green layers of material rich in manganese and iron, looking like shingles on a steeply inclined roof.

Between the "shingle" deposits, the volcanic rock was thinly covered by tan sediment, appearing like a light snowfall on the rift valley wall. Black and red patches were observed in this sediment, which Rona said were areas where manganese- and iron-rich hot springs are seeping slowly up through the sea floor.

Using a mechanical arm of the submersible, the team broke off pieces of the deposit and recovered water samples. They are being analyzed at Woods Hole and the Massachusetts Institute of

Technology.

The deposits are formed when cold, heavy seawater descends through fractures in the sea floor, comes in contact with hot volcanic rocks, and rises as hot, light solutions that dissolve various metals present in low concentration in the volcanic rock. The metals are redeposited in more concentrated form both beneath the sea floor where the rising hot solutions mix with cold seawater, and where solutions flow up through the sea floor as metal-rich hot springs.

Slow-spreading ocean ridges form new sea floor from volcanic activity at a rate of inches per year; fast-spreading ridges form new sea floor at rates up to 10 times as fast. Approximately two thirds of ocean ridges are slow-spreading.

NOAA used the ALVIN a year ago to discover an undersea ore deposit valued at $2 billion or more at a fast-spreading site in the eastern Pacific Ocean off the coast of Ecuador.

STORM GROUNDS KETCH

A 40-ft ketch on a passage from Puerto Rico to Chesapeake Bay was beached at Cape Hatteras, N.C. when a subtropical storm drove the sailboat ashore June 19 (front cover).

Alain Feurenstein, owner of the SAO TOME, lost his bearings as he approached Diamond Shoals on the 18th. He contacted the Coast Guard at Hatteras Inlet for a radio check, and at 3:45 a.m. the next morning, reported he was losing control of his steering.

Feurenstein beached his two-masted boat hard in soft sand north of the cape, burying its keel in 2 to 3 ft of water with the hull broadside to the beach.

Seas surged 15- to 20-ft in the inlet as the Coast Guard dispatched a 44-ft motor lifeboat to assist Feurenstein, his wife and two preschool children. The family had lived aboard their ketch for 4 yr working their way from Europe to Africa, Brazil, the Caribbean, and Puerto Rico. SAO TOME was headed for Norfolk, Va. when it encountered the summer storm off Cape Hatteras.

The ketch was refloated after local firemen and area residents armed with shovels dug the keel free and a Coast Guard boat towed the SAO TOME off the shore. Damage to the cruising ketch was minimal and the Feurensteins sailed on to Norfolk.

See Letter to the Editor for another encounter with this storm.

LETTERS TO THE EDITOR

SUBTROPICAL STORM--JUNE 18-20, 1982

The following letter from Steven Montgomery describes his encounter with the Subtropical Storm of June 18 to 20, 1982, while sailing from Bermuda to Buzzards Bay. The storm was described in the Fall 1982 issue, both in the Weather Log and Hurricane Alley (fig. 24). The encounter of the SAO TOME with the storm is detailed on this page with her picture on the front cover.

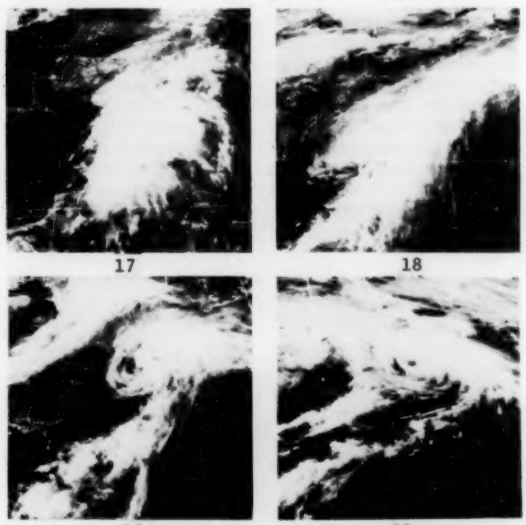


Figure24.-- The storm as it appeared at 1700 on the 17th, 18th, 19th, and 20th.

S.S. HOWELL LYKES
11/16/82
At sea
Livurno toward Houston

TO: The Editor
Mariners Weather Log
FROM: T.S. Montgomery
Ch/Officer, S.S. HOWELL LYKES

Dear Sir;

I am requesting information on a tropical storm which formed off the coast of Florida in June, followed the approximate path of the Gulf Stream and caused a two day postponement of the Newport race scheduled to start on June 18.

I departed from St. George, Bermuda on June 15 or 16 (my log is not available at this time) bound for Mattapoisett on Buzzards Bay, in a 36 ft ketch rigged sail boat. On the 19th or 20th of June, I crossed the approximate axis of the Stream and ran into very ominous weather with periods of torrential rain and rough seas from the south. By midafternoon the ketch hove to on a starboard tack under storm sail in very heavy, cresting seas and 50-kn winds. By 1700 the kenyon wind indicator was registering winds of 70 kn in gusts with sea and swell conditions quite high, possibly 30 ft and breaking. The yacht was being overpowered by the tiny storm sail and laying over with excessive leeway on her. With much difficulty all sail was taken off and we lay ahull sustaining one serious knockdown when the boat was caught in a cresting sea and thrown into the trough on her lee side.

By 0400 the next morning the wind showed indications of easing up, and at 0800 we were able to make sail and get under way in a moderating force 6 wind and a very rough, confused sea condition.

I believe that the storm center passed very close to our position due to the rapid fall of the barometer and intensity of the wind. The most severe part of the storm lasted approximately 12 hr and I suspect that it was moving quite rapidly at this point. On departure from Bermuda there had been no warning of this depression.

I have heard unconfirmed reports that other boats suffered damage with loss of life during this storm and I recall four or five yachts departing for various East Coast ports about the time of our departure.

I would appreciate any information available on this storm, specifically the track and positions of the center during the approximate period from June 16 thru June 22, 1982 including maximum wind velocities, vessel reports and data.

I was born and raised in a coastal town north of Boston, and a seaman for over 20 yr and the ocean and weather have always been a part of my life, but this storm was one I will never forget.

We receive the MARINERS WEATHER LOG on board but this voyage we do not have the June volume for 1982. Please bill any charges due for postage, etc. for the above information to the address below. Thank you for your time.

Sincerely yours,

T.S. Montgomery
Ch/Officer, S.S. HOWELL LYKES

MARINE WEATHER REVIEW

The Weather Logs combined with the cyclone tracks, U.S. Ocean Buoy climatological data, gale and wave tables, and mean pressure pat-erns are a definitive report on the weather systems and primary storms which affected the North Atlantic and North Pacific Oceans during this 3-mo period. Hurricane Alley lists and describes tropical cyclones worldwide. Unless stated otherwise, all winds are sustained winds and not gusts; all times are G.M.T.

North Atlantic Weather Log

July, August and September 1982

WEATHER LOG, JULY 1982--Most of the stronger and larger storms were confined to eastern Canada and dissipated or weakened over Baffin Bay or the Labrador Sea. There was a primary storm track from the Maritime Provinces to Kap Farvel. This approximated the climatological track which extends to Iceland. There was a secondary track from Virginia to near 50°N, 40°W where it fanned out, also close to climatology. One storm tracked almost due northward from off Morocco to Jan Mayen Island. There were many short-lived frontal waves and low-pressure centers not on the track chart.

The mean sea-level pressure was dominated by the 1028-mb Azores High centered near its climatic location of 36°N, 38°W, but 3 mb higher pressure. Pressure ridges extended into the southeastern United States and northern Europe. A 1005-mb Low center was over the eastern Foxe Basin, northwest of its 1008 mb counterpart. A small 1010 mb climatic Low over Iceland was not present (fig. 25).

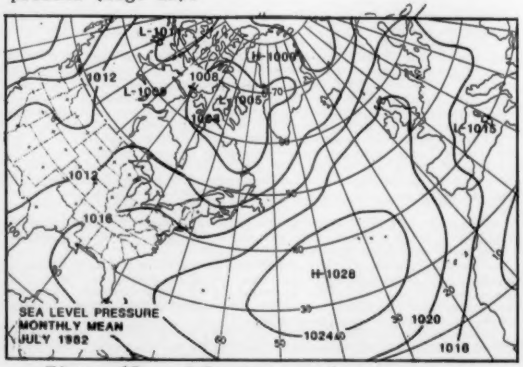


Figure 25.-- July mean sea-level pressure.

There were two significant positive anomaly centers; a 7 mb over the North Sea with a 6 mb over the Baltic Sea, and a 3-mb near 37°N, 39°W. There were also two negative anomaly centers with both over solid terrain; one was minus 6 mb over east central Greenland and a minus 4 mb over Baffin Island. The ocean area south of a line from Cape Race to Nordkapp was generally positive.

The upper air flow at 700 mb was generally stronger over the northern shipping lanes and more northeasterly. There was an anomalous low center over Frobisher Bay. The climatic low over the North Pole was 86 m deeper than normal. There was the usual trough paralleling the North American coast and a sharper than usual trough west of Spain. The high was slightly east of its normal position and about 20 m higher. There were no tropical cyclones this month.

Extratropical Cyclones--The Azores High was definitely the dominant feature the first 2 weeks. There were some cyclones over the Maritime Provinces. During the month the stronger storms were over eastern Canada. During the third week the High split into two centers with the strongest off Ireland. During the fourth week a large weak LOW was found near the Azores.

A frontal wave was found near Delaware on the first chart of the 4th. At 1200 the SEA-LAND VOYAGER measured 50-kn winds and 18-ft seas near 38°N, 65°W, about 150 mi southwest of the center. There were a few gale reports. The ACADIA measured 45-kn winds and 20-ft waves on the 5th in the warm sector (39°N, 54°W). The cyclone raced northeastward at over 40 kn from 1200 on the 5th to 1200 on the 6th. The storm slowed late on the 6th and intensified to 984 mb near 60°N, 23°W. On the 7th the TOM JACOB (59°N, 18°W) measured 40-kn winds and 23-ft seas (fig. 26). The storm started weakening on the 8th and disappeared over the Greenland Sea on the 10th.

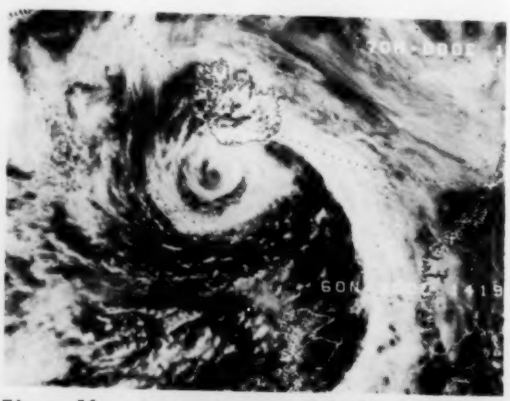


Figure 26.— A mature storm with the occlusion spiraling into the northern edge.

This weak LOW formed in a trough southeast of a LOW over Hudson Bay on the 7th. It moved southeastward as a weak circulation until 1200 on the 10th when it was 1007 mb near 48°N, 14°W. It was a small storm. The SEA-LAND ADVENTURER (49°N, 14°W) measured 42-kn winds and 20-ft waves. The ESSO PICARDIE (47°N, 11°W) measured 54-kn southerly winds and 13-ft seas. The NEDLLOYD KATWIJK (38°N, 10°W) found 47-kn winds on the 11th and the TILLIE LYKES (48°N, 13°W) had 40 kn on the 12th. The LOW disappeared that afternoon.

This was a long-lived LOW. It was first analyzed on the 7th over eastern Washington state. It moved across the Great Lakes on the 10th and 11th and produced thunderstorms as it deepened. The storm weakened again over the Labrador Sea on the 14th. The LOW started intensifying again on the 15th and at 0000 of the 16th was 990 mb over the Denmark Strait. The GODAFOSS measured 37-kn westerly winds off Kap Farvel. On the 17th two Soviet ships were south of Iceland, one had 37-kn west winds and the other 26-ft waves. The EGLANTINE (50°N, 01°W) measured 47-kn winds. On the 18th two Danish ships near 59°N, 36°W found 35- to 47-kn winds. By the end of the day the storm was gone.

This LOW popped up in the col area between two high-pressure cells on the 20th. The KIMI MARU measured 37-kn easterly winds on the 21st north of the center. On the 23d the MARY ANN (45°N, 40°W) measured 45-kn winds but the direction was wrong. A French ship had 39-kn southeasterly winds on the 24th. The MARY ANN was north of the weakening storm on the 25th with only 16-kn easterly winds and 20-ft waves. The LOW drifted eastward until disappearing late on the 27th.
This potential storm was first found over Iowa on the 27th. It traveled eastward with little development until the southern flow was off the coast. At 1200 on the 29th the 998-mb LOW was over the Bay of Fundy. Two RIGGs near 44°N, 60°W measured southeasterly gales. The DAWSON (47°N, 61°W) had 45-kn winds from the east-southeast. The wind at the observatory atop Mount Washington in New Hampshire, elevation 6,280 ft, reached a peak of 92 kn.

On the 30th, there were several gale reports. The LUCY MAUD MONTGOMERY (47°N, 62°W) measured westerly 42-kn winds. By the 31st at 1200 the 996-mb storm was at 54°N, 46°W. The VALOR at 46°N, 45°W measured westerly 58-kn winds. On August 1 the storm was weakening and of no concern to ships.

Casualties--The ANNA V. arrived at Barbados on the 26th with a cargo of vehicles damaged in heavy weather. The NANGARD grounded in fog outside Kalmar. The WILDRAKE was struck by lightning on the 15th in the North Sea. The MAJESTIC, from New Orleans to Montevideo, arrived on the 16th with heavy weather damage. Plans to tow the HERCULES with an unexploded bomb aboard away from the coast of Brazil and sink her in deep water were delayed by bad weather on the 19th.

WEATHER LOG, AUGUST 1982--Again this month the larger and stronger storms were over Quebec and eastern Canada. The mean primary storm track that affected shipping stretched from Nova Scotia to the Faeroe Islands. There was a concentration of circling storm centers early in the month between Kap Farvel and Iceland. Also there was a short concentration of storm center paths from about 39°N, 60°W to 45°N, 35°W. These paths would have matched climatology closely if they were shifted northwestward.

The gross mean sea-level pressure pattern was close to the climatic pattern. The 1028-mb Azores High was at 38°N, 33°W, 5 mb higher than normal and 200 mi northeast of its climatic counterpart. There were three low-pressure centers in the northern latitudes. The deepest was 1003 mb near the Faeroe Islands. The second Low was 1007 mb near Hebron, Labrador, and an anomalous 1007-mb center was near Jakobshavn, Greenland (fig. 27).

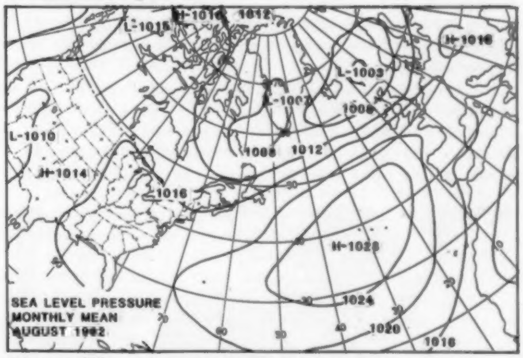


Figure 27.-- August mean sea-level pressure.

There were four significant anomaly centers. There was a large positive area of 4 mb or greater, about 900 mi square, with a 6-mb center off the Iberian Peninsula. The sea-level pressure anomalies south of approximately latitude 53°N were positive. The deepest negative anomaly center was 6 mb near 63°N, 03°W. There was a negative 5-mb center off central Greenland, and a 3-mb center near Hopedale, Labrador.

The upper-air flow at 700 mb was primarily zonal between latitudes 40°N and 60°N. There were two anomalous Low centers, one west of Kap Farvel and the other east of Iceland. The gradient was tighter than normal producing higher winds in the zonal flow. A trough line paralleled the coast of the United States with another over central Europe that was displaced eastward.

Tropical storm Beryle occurred late this month.

On August 6, 1918, unusual hot weather began to overspread the Atlantic coast states from the Carolinas to southern New England. The temperature reached an all-time high 106°F at Washington, D.C. On the 7th, Philadelphia, Pa., also hit 106°F.

Extratropical Cyclones--During the first week of the month the weather was dominated by a large

multicentered Bermuda-Azores High. The second week the High split into two major centers; one moved west toward the central ocean and the other northwestward over Europe. During the third week the High combined again into one center near the Azores and moved westward. That center drifted northward to latitude 40°N then southward to its normal location. The stronger cyclone centers generally stayed northwest of a line from Cape Race to the Orkney Islands. Cyclones south of that line were generally frontal waves.

The first significant storm of the month, and only relative to the season, formed over James Bay on the 1st. On the 3d and 4th the LOW stalled off the coast of Labrador at about 1000 mb. By 1200 on the 6th the LOW was 997 mb near 61°N, 35°W. The ICEPORT supposedly measured 58-kn westerly winds at 59°N, 36°W, at 1800. At 0600 they had been 47 kn from the north near 59°N, 41°W. On the 7th the OXHQ was in Davis Strait in the northerly flow with 35-kn winds. The ICEPORT now had 47 kn as she sailed eastward. A Soviet ship found 23-ft waves slightly south of the storm center.

A frontal wave was moving northeastward through the southern edge of the storm and the SEA-LAND VOYAGER had 20-ft waves near the cold front. The ASIA BRAVERY (48°N, 28°W) measured 42-kn winds near the front on the 8th (fig. 28).

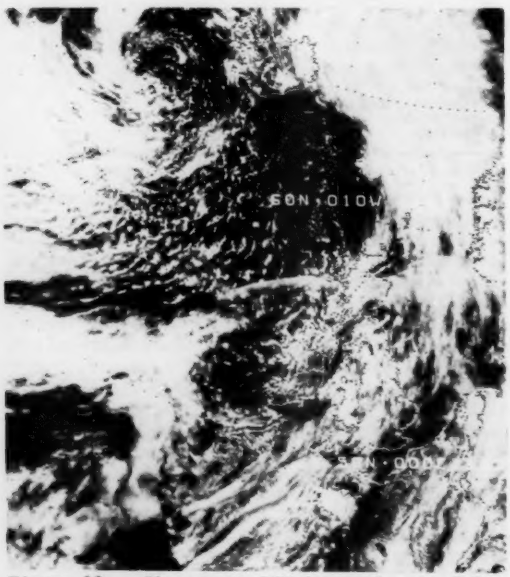


Figure 28.-- The parent LOW is southwest of Iceland with the front sweeping down the east side of the picture. An interesting feature are the lens shaped high clouds near 50°N,15°W and 57°N, 15°W.

On the 9th the storm moved over Iceland. The GTOT (57°N, 09°W) measured only 27-kn winds but the swells were 20 ft. A small LOW suddenly appeared east of Kap Farvel and the Soviet ESSR found 25-ft westerly seas. Several ships found gales near Scotland, including the BRITISH CENTAUR with 42 kn. On the 11th the storm disappeared in the Norwegian Sea.

This frontal wave was first analyzed on the 7th east of Norfolk, Va. It developed slowly between two high-pressure cells. At 1800 on the 9th the ASIA BRAVERY (46°N, 38°W) measured 36-kn easterly winds north of the warm front. The storm started expanding on the 10th as it emerged from between the HIGHs, and there were some gales. By 1200 of the 11th the central pressure was 984 mb near 57°N, 16°W. The AMERICAN LEGACY and SEA-LAND VENTURE both had 40-kn winds near 50°N, 23°W with waves up to 17 ft. The DART ATLANTICA (50°N, 18°W) had 23-ft waves.

The storm continued to deepen and at 1200 of the 12th was 974 mb. At 0300 that day the SMIT LLOYD 62 (59°N, 01°W) measured 58-kn southerly winds. There were many gale reports over the North Sea. On the 13th the VLAS NITCHKOV had 39-kn southerly winds and 23-ft swells near 64°N, 07°E. The storm turned northwestward and disappeared north of Jan Mayen Island on the 16th.

This next storm suddenly deepened from a trough that was moving over Greenland on its southeast coast on the 13th. Fishing vessels in the Denmark Strait immediately felt its influence. At 1200 on the 14th the LOW was 978 mb near 61°N, 37°W. The ATLANTIC PRELUDE near 52°N, 36°W measured 45-kn winds. The USFG reported 26-ft waves near 59°N, 37°W. At 0000 on the 15th the ATLANTIC PRELUDE was measuring 47-kn winds and still not reporting waves. The ESSR (55°N, 38°W) measured only 31-kn winds but reported 23-ft seas. A British ship, GTOT, near the western Irish coast had 20-ft swell waves.

The storm was south of Iceland on the 16th at 978 mb. At 0300 LIMA measured 40-kn winds and 18-ft waves. The higher winds were generally gales on the 17th as a frontal wave was moving through the southern semicircle. The AFRICAN ADDAX was between the two centers but under the influence of the northern one, with 17-ft seas and 25-ft swells from the northwest. On the 18th she had 30-ft swells as she sailed westward (fig. 29).

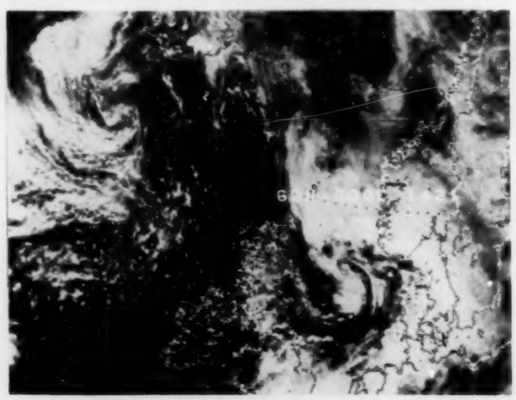


Figure 29.-- The original storm is south of Iceland. The frontal wave is becoming the primary storm over the North Sea.

The frontal wave became the primary center on the 19th at 982 mb west of Trondheim, Norway. The higher winds were under 40 kn with 20-ft maximum waves. The 20th brought a measured wind of 45 kn from the ESSO WARWICKSHIRE near 59°N, 07°W. The storm broke up into multiple centers on the 21st.

This frontal wave was first analyzed on the 0000 chart of the 22d south of Sable Island. It raced northeastward through the southern circulation of a LOW over the Labrador Sea. By 1200 on the 24th the storm was 989 mb near Rosemary Bank (fig. 30). The WALTER HERWIG (57°N, 14°W) found 45-kn northwesterly winds and 23-ft seas. The ESSO WARWICKSHIRE (58°N, 09°W) also measured 45-kn northwesterly winds, 17-ft seas, and 26-ft swells. The DISCOVERY (52°N, 31°W) radioed 62-kn measured west winds at 1800. The speed seemed high but all the remainder of the observation looked good. There were reports on the 25th of winds up to 44 kn and waves up to 23 ft. Another LOW from off the southeast coast of Greenland moved through the southwestern circulation on the 26th. The storm moved across Scandinavia on the 28th.

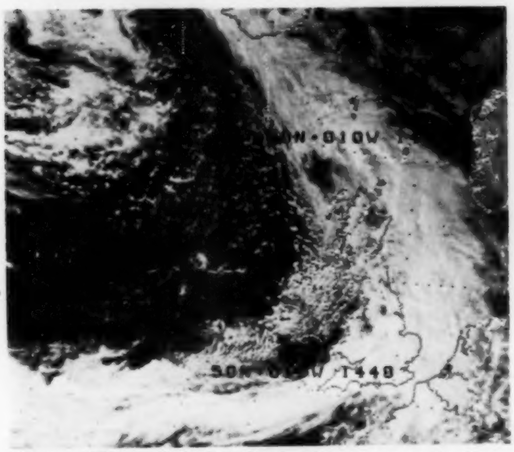


Figure 30.-- High level clouds obscure the low-level center.

The central plains of Kansas and Oklahoma gave birth to this LOW on the 24th. The southerly flow had penetrated off the east coast by 1200 on the 25th. The storm was 994 mb over Prince Edward Island at 1200 on the 26th. The CRYOS measured 48-kn winds and 10-ft waves south of Cape Sable at that time. Others were reporting gales and the DELAWARE II had 20-ft waves south of Sable Island. On the 27th the LUGWIGSHAVEN EXPRESS, east of Cape Race had 45-kn westerly winds and 23-ft waves. The AMERICAN ACE, 350 mi southeast of Cape Race, reported 36-ft waves from the southwest with only 22-kn winds.

This storm had more affect on the shipping lanes than any other this month as it developed early and persisted. At 1200 on the 28th it was 980 mb near 58°N, 30°W (fig. 31). At 0900 CHARLIE measured 48-kn south-southwesterly winds and

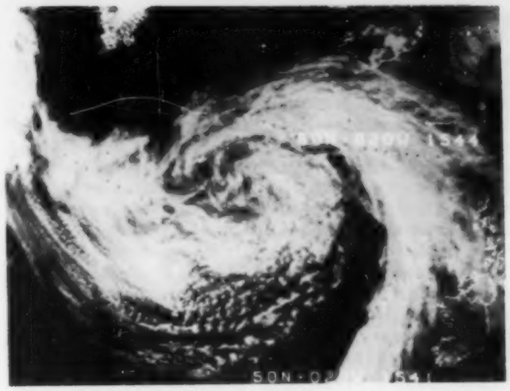


Figure 31.-- At 1543 the storm is centered near 58°N, 27°W. The coma-shaped and cumulus clouds indicate instability.

28-ft seas. Several ships experienced waves of 20 ft or more. The 29th brought 50-kn winds to the CHARLOTTE BASTIAN at 57°N, 20°W. The storm was over the Norwegian Sea on the 30th and weakening but the MEERKATZE II did not believe it with 55-kn winds at 56°N, 08°W. On the 31st it was near Nordkapp.

This storm came out of the Northwest Territories of Canada. It combined with a frontal wave centered over new Brunswick on the 28th. At 1200 it was 986 mb over Quebec Province. There were some gales at this time. At 1200 on the 29th the storm was 976 mb off Hebron, Labrador. The 0000 report from the EASTERN SNELL was a measured 77 kn. The VC 9450 called the winds 46 kn. The storm weakened in the northern Labrador Sea on the 30th, but a Canadian ship north of St. John's measured 54-kn winds, no seas reported. The storm broke up crossing the Ice Cap.

The 28,000-ton Canadian bulk carrier ARCTIC set a new record for earliest penetration by a merchant ship into the Canadian High Arctic when she arrived at Little Cornwallis Island on August 1. The voyage was made without icebreaker assistance. They were in radio contact with the Canadian icebreakers JOHN A. MACDONALD and the LABRADOR. She was to load lead and zinc concentrate.

Casualties--The ARCTIC VIKING reported to Montreal on the 12th with ice damage. The KANGVIK was refloated on the 9th owing to ice damage. The SOODOC sustained ice damage on a voyage from Montreal to Little Cornwallis Island the 21st to 24th.

The DAUNT ROCK hit a pier in fog departing Seaham. The ARIANA and DAMODAR collided in heavy weather at Port Alfred. The MASSACHUSETTS broke her mooring lines at Brooklyn on the 25th. A lifeboat on the MAR OCEANO broke loose in bad weather west of Sable Island on the 26th.

The NEDLLOYD EVEREST and OAK PEARL suffered heavy weather damage. The QUIZANDAL headed for Venezuela sank in bad weather on the 4th.

WEATHER LOG, SEPTEMBER 1982--The mean position of the Azores High was about 14° longitude west of its normal position and 3 mb higher in pressure. This at least partially explains the location of the primary storm track. The primary track extended from near Hamilton Inlet, Labrador, to 60°N, 35°W. This was northwest of its climatic counterpart which originates over New Brunswick, Canada. There was a conglomerate of tracks in the vicinity of the Denmark Strait and Iceland in many directions. There were several tracks off the U.S. East Coast but with no concentration.

The Icelandic Low was 1000 mb, 5 mb lower than normal, near 62°N, 22°W. This was about 200 mi east of the normal position. There was a 1002-mb subcenter northeast of Iceland near 68°N, 0°. The 1024-mb Azores High near 34°N, 46°W was 3 mb higher and about 700 mi west of its normal location (fig. 32).

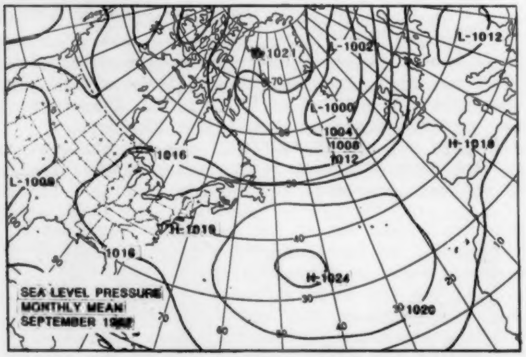


Figure 32.-- September mean sea-level pressure.

There were two large anomaly centers that affected the weather over the shipping lanes. One was a narrow elongated negative area with a 5-mb center that stretched from southwest of Iceland to Nordkapp. The other was a large elongated positive area with a 4-mb center near 37°N, 50°W, that extended west-northwest from the Spanish Sahara to the 4-mb center and then north-northwestward across Hudson Bay to Victoria Island and into the Arctic Ocean. The pressure over eastern Europe was higher than normal.

The primary upper-air circulation center at 700 mb was near the North Pole, as normal. There was an anomalous LOW near Keflavik, Iceland. This sharpened the usual trough along longitude 20°W. The flow between latitudes 40° and 60°N was zonal.

Tropical cyclone Chris and hurricane Debby occurred this month.

Extratropical Cyclones--The first week of the month the Bermuda-Azores High dominated the ocean and stretched from the east coast of the U.S. to eastern Europe with several centers. The second week the High gradually weakened and drifted southward. The LOWS gradually increased in intensity and also moved southward. By the end of the week, the Azores High did not exist, with high centers southeast of Newfoundland and over central Europe. These Highs weakened the third week and a cut-off LOW formed near the Azores. There were LOWS over the northern shipping lanes and hurricane Debby penetrated north of latitude 50°N. The fourth week there was near normal high and low pressure configuration. Low-pressure centers were approaching winter configuration but not intensity.

This was a very long-lived storm that traveled from Manitoba, Canada, to the White Sea. It was a large storm when it passed north of the Great Lakes on the 2d and 3d. On the 4th the RIGG and SEDCO 706 near 48°N, 49°W, reported gales. By 1200 on the 5th the 997-mb storm was over the Labrador Sea. The ANSGARITOR (49°N, 43°W) had 40-kn winds with 21-ft waves. The ICEPORT reported measured 72-kn winds near 59°N, 45°W at 1800 and 0000 on the 6th but the gradient makes it appear that the wind indicator code was wrong and the speed in knots was doubled on conversion from meters per second.

By 1200 on the 6th the storm was 992 mb near 61°N, 23°W. There were several gale reports west, south, and east of the center on the 6th and 7th. By 1200 on the 8th the storm was over Sweden and on the 9th over the White Sea.

St. George's Bay, Newfoundland, produced this frontal wave on the 7th. As the storm passed over 48°N, 50°W the SEDCO 706 had 48-kn winds. By 1200 on the 9th the LOW was 979 mb near 60°N, 23°W (fig. 33). Icelandic fishing vessels north of the center were finding winds up to 45 kn. The YOKOHAMA MARU (58°N, 15°W) estimated 60-kn southwesterly winds and 18-ft waves. At 1200 on the 10th the storm was 970 mb on the south coast of Iceland. Three ships measured very strong winds. They were along latitude 59°N between 07° and 19°W.

The ships were the BISCHOFSTOR (63 kn and 33-ft waves), the ICEPORT (80 kn), and the NARWIK II (75 kn). Icelandic fishing vessels in northerly winds northwest of the center had 35- to 60-kn winds. Some other ships reported 20- to 25-ft waves. Winds of 50 kn appeared to be the highest on the 11th, as a new center formed over the Norwegian Sea.

Figure 33.-- The vortex of the storm was south of Iceland at 1500.

It appeared that a convention of LOWS was gathering off the United Kingdom on the 19th awaiting the arrival of hurricane Debby which was racing eastward north of latitude 50°N (fig. 34). By 1200 on the 20th three of the centers had combined into a 985-mb LOW over the Hebrides. The BANDAR DENPASAR (49°N, 23°W) had 42-kn winds and 23-ft seas. Debby had decreased to a tropical storm near 52°N, 28°W. She rapidly became extratropical and by the 21st only qualified as a frontal wave south of the 968-mb LOW. The many platforms and ships in the North Sea were reporting winds up to 60 kn and waves up to 30 ft. On the 22d the storm was over Lapland affecting only the Arctic Ocean. A ship on the White Sea reported 35-kn winds and 25-ft seas.

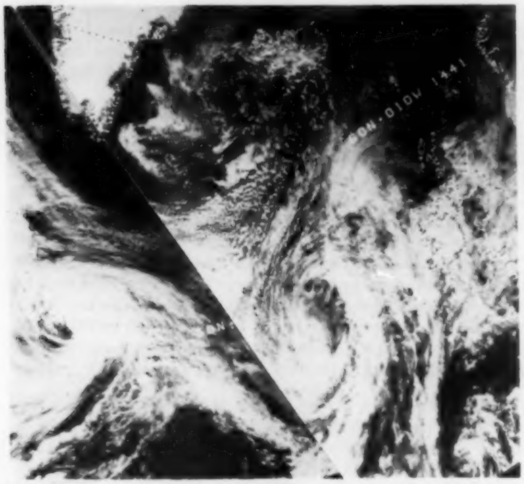


Figure 34.-- Hurricane Debbie, south of Kap Farvel, is racing eastward to combine with the other three LOWs west of Europe.

This was one of those LOWS that suddenly appears on or off the southeast coast of Greenland after a LOW from Canada strikes the southwest coast of Greenland. This one appeared on the 1200 chart of the 22d near 60°N, 35°W. The LOW was 974 mb by 1200 on the 23d. The Soviet ship ESSR (55°N, 34°W) had 35-kn winds and 33-ft seas. Three other ships reported measuring winds near 60 kn including the MANCHESTER CHALLENGE at 52°N, 18°W. At 1800 the QUEEN ELIZABETH II measured 46-kn winds and 30-ft waves near 50°N, 33°W. On the 24th the ATLANTIC COGNAC (51°N, 26°W) had 33-ft seas as did the EXPORT DEMOCRACY (46°N, 25°W). The latter's waves were still 30 ft at 1200 on the 25th. ROMEO had 26-ft waves. The storm was 972 mb off Ireland. ROMEO still had 30-ft waves on the 26th and the LONDON VOYAGER had 33-ft waves on the Bay of Biscay.

On the 27th another LOW was moving westward along latitude 60°N. A ship southwest of it had 50-kn winds and 20-ft seas. The original LOW was still producing waves over 25 ft and winds over 50 kn south of its center. By 1200 the second LOW was the primary center. CHARLIE had 40-kn winds with 21-ft waves. ROMEO had 23-ft waves. This LOW moved northeastward out of the picture.

On the 27th, hurricane-force winds whipped the coast of north Wales. Hundreds of trees were uprooted in 80 mi/h winds and trailers overturned. Many people were injured.

This was the largest and deepest storm of the month by the last day. It had its origin west of Lake Winnipeg on the 25th. It moved over southern Hudson Bay on the 26th and 27th. The storm was over the Labrador Sea at 986 mb on the 28th. Several ships in the area had gales and waves about 20 ft. The BRITSUM (60°N, 58°W) had 54-kn winds and 23-ft waves. The PELERIN did a fine job of radioing her observations each 3 hr near 59°N, 60°W. On the 29th a frontal wave entered the southern circulation. There were many gales and strong gales. By 0000 on the 30th the two LOWS had combined into one 961-mb center near 59°N, 33°W. The cyclonic circulation now reached from Newfoundland to Ireland and south to 40°N. By 1200 the LOW was 946 mb near 59°N, 30°W (fig. 35).

Figure 35.-- This very high resolution image shows the storm in 0.5 km resolution.

There were many reports of winds gale force or greater and waves higher than 20 ft in the 24 hr of the 30th. At 0600 the buoy 64521 reported a pressure of 955 mb with 41-kn winds from 070°; at 1200 the pressure was 946.8 mb. The BRITSUM (56°N, 41°W) measured 60-kn northwesterly winds and 38-ft waves at 1200 and 69 ft at 1800. The VOLUTA (56°N, 31°W) had 54-kn winds from the southwest with 39-ft waves. CHARLIE had 26-ft waves. On October 1 the storm was 950 mb and moving southeastward. CHARLIE had winds up to 50 kn and waves up to 33 ft. The NURNBERG EXPRESS (50°N, 42°W) had 39-ft waves. The KEILDRECHT (53°N, 29°W) was battered by 44-ft waves.

The storm was weakening on the 2d as it turned northward. LIMA measured winds up to 48 kn and waves of 26 ft. The storm moved over Iceland on the 3d and disappeared into the Norwegian Sea.

Casualties--One of the first casualties of the month was due to ice of all things. The TERRA NORDICA had steering gear failure due to encounter with heavy ice September 2-5 enroute from Frobisher Bay to Bangnirdong, NT. The AMAZONIA ran aground in rain in the Amazon River near

Manaus. The ALEKSEEVKA contacted the AMINMER in Istanbul Strait on the 25th. The ANTHOL grounded near Plymouth wharf in high winds and seas on the 12th. The STAR ARCTURUS lost a liferaft overboard in high seas on the 21st near the Shetland Islands. The NAXOS was at Lisbon for a survey of heavy weather hull damage.

Fog was the worst enemy this month. The ARMORIQUE hit a rock at the entrance to St. Malo Channel in poor visibility on the 18th. On the 8th the two trawlers PENHA and TIMANEL collided in fog off Aveiro.

The following ships had fog problems in the Kiel Canal on the 15th and 19th: INTRA TROPHY, JOZEF WYBICKI, KARYSTOS, and TADEUSZ KOSCIUSZKO. The two Sealink vessels KONINGIN JULIANA and SAINT GEORGE collided in fog off Parkeston Quay on the 15th. There was only slight damage and no injuries.

The TRAMONTANA lost an anchor and eight lengths of cable on the 4th in heavy weather while at anchor off Richards Bay.

North Pacific Weather Log

July, August and September 1982

WEATHER LOG, JULY 1982--There appeared to be a larger number of storms than normal this month. Over the western ocean they originated south and east of Japan and were concentrated between latitudes 30°N and 40°N until about longitude 175°E where the track turned northeastward then northward across the Alaska Peninsula. A few storms branched off across the Gulf of Alaska toward Sitka. A second widely separated group of storms crossed into the Bering Sea from Siberia. Two storm centers penetrated into the area of the Pacific High south of latitude 50°N during the second week of the month. The major difference from climatology was the easterly rather than northeasterly track over the western ocean and the sharp turn northeasterly over the central ocean.

The mean sea-level pressure pattern was very close to the climatic normal. The principal feature was the 1026 mb Pacific High normally centered near 40°N, 153°W. There was an anomalous 1017-mb High center near 43°N, 165°E. A 1010-mb Low was centered over the central Bering Sea (fig. 36).

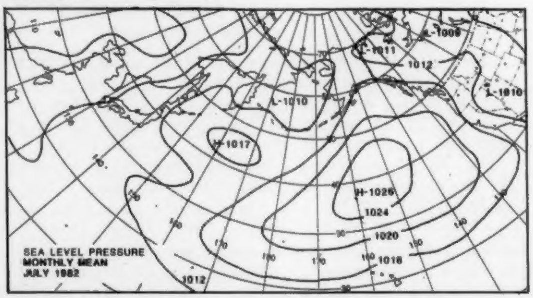


Figure 36.-- July mean sea-level pressure.

The eastern half of the ocean was near normal with the largest anomaly plus 2 mb. Over the western ocean there were two 4-mb anomaly centers. The plus 4 mb center was south of Kamchatka. The minus 4 mb area was curved like a boomerang following the primary storm track.

The upper air at 700 mb differed from climatology mainly because of an anomalous low center over the Bering Sea. This low resulted in a 71-m anomaly center south of Adak Island. The high center near latitude 30°N was 18 m higher than normal. These two height centers produced a much tighter upper-air gradient. The low center with its deeper and sharper trough helps explain the storm track behavior.

There were seven tropical cyclones over the eastern North Pacific: hurricanes Daniel, Fabio, Gilma, and Hector and tropical storms Carlotta, Emilia, and Iva. The western North Pacific produced four: typhoons Andy and Bess and tropical storms Val and Winona.

Extratropical Cyclones--This was a fairly quiet month with high pressure, particularly the Pacific High, dominating the weather. High pressure centers moved eastward out of Asia and reinforced the Pacific High. Many of the cyclones developed as frontal waves between the high pressure cells.

This first storm formed as a frontal wave south of Tokyo on the 2d and south of a HIGH. The front stretched from a LOW over the Alaska Peninsula to Taiwan with three frontal waves. On the 4th the SIENA (35°N,159°E) measured 44-kn northeasterly winds. The ATLANTIC WING south of the LOW had 20-ft waves. There were some gale reports on the 5th when the 1000-mb storm was near 35°N, 168°E. The storm gradually dissipated as it moved over the weak Pacific High.

On the 5th another frontal wave formed northeast of the one described above and traveled northeastward. By 0000 of the 6th it was 990 mb near 44°N, 173°W. The winds were mainly gales but the YAMASHIN MARU at 42°N, 171°W measured 47-kn southwesterly winds with 20-ft waves at 0600. At 1800 the PRESIDENT HOOVER (45°N, 165°W) had 44-kn winds. By 0000 on the 7th the 984-mb storm had traveled to 51°N, 159°W (fig. 37). Two ships near each other, 46°N, 161°W, found 33-ft swell waves with 35- to 42-kn winds. They were the KOREAN WONSSUN and TOSHU MARU. The EXXON HOUSTON found 20-ft waves on the 9th. The storm became stationary near 51°N, 145°W and finally dissipated on the 12th.

The Pacific High built northeastward and the heat Low over the northern Gulf of California, with its trough over California, intensified on the 13th. This produced the typical tight gradient off the California coast. The VLADIMIR MAYAKOVSKIY off San Francisco found 43-kn winds.

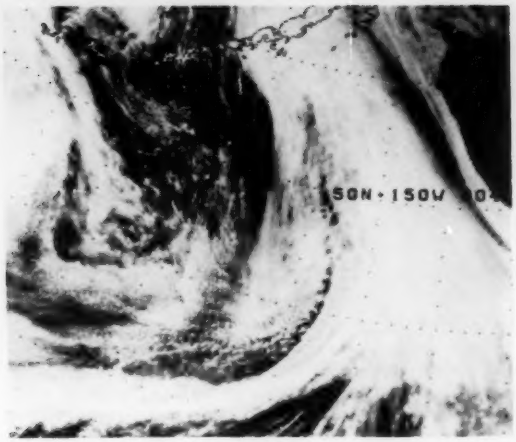


Figure 37.-- The surface LOW is hidden under the high clouds.

On the 15th, the KENAI and the SEA-LAND LIBERATOR both near Cape Mendocino had 35- and 40-kn winds with 12- to 20-ft waves (fig. 38). On the 16th the EXXON BENICIA found 40-kn winds and 21-ft waves in the same area. On the 17th the gradient relaxed some, but on the 18th the BROOKLYN still located 35-kn winds and 20-ft waves north of the Farallon Islands. All reported winds were below gale force by the 19th.

This frontal wave came out of China on the 13th. It traveled eastward until the 17th as an open frontal wave. At 0000 it was at 36°N, 165°E. The KOREAN WONIS SEVEN at that time was at 36.4°N, 163.6°E with 35-kn northeasterly winds and 23-ft swells. The VENUS DIAMOND found 35-kn southerly winds with another frontal wave to the northeast on the same front. At 1800 on the 18th the VENUS DIAMOND measured only 20-kn winds with this wave but the swell was 26 ft. The storm disappeared on the 21st.

Another frontal wave formed on the 20th near 38°N, 170°E. By 0000 on the 22d it was near 50°N, 172°W. At 2300 on the 21st, the PRESIDENT GRANT

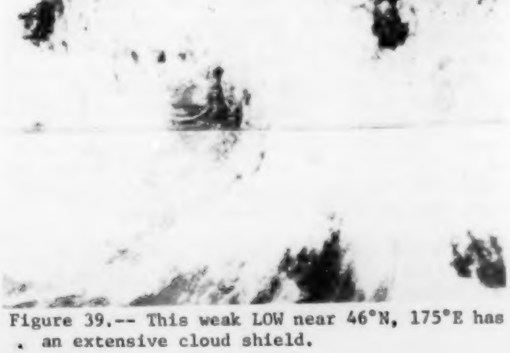


Figure 39.-- This weak LOW near 46°N, 175°E has an extensive cloud shield.

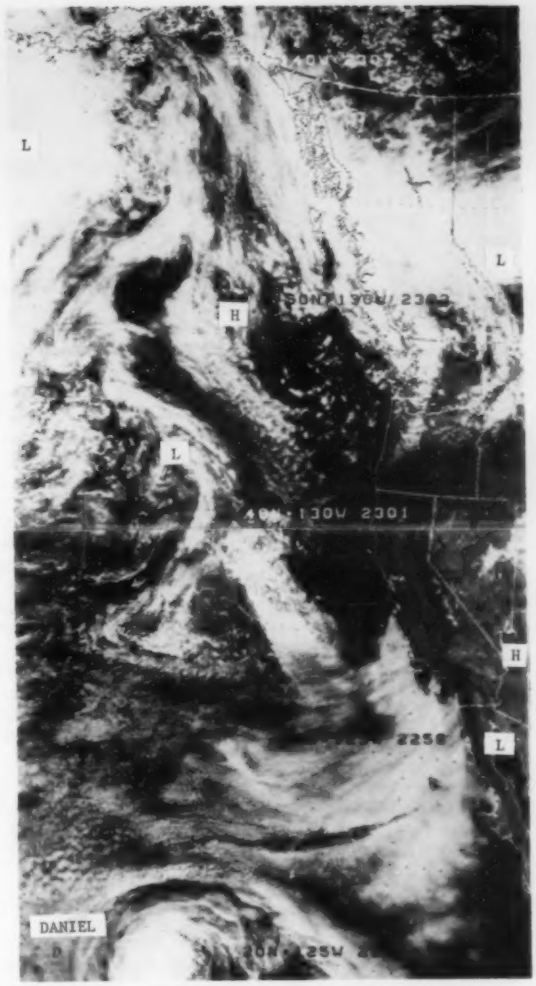


Figure 38.-- Weather systems along the North American coast 2300 July 14.

(47°N, 176°W) measured 36-kn northwesterly winds and 16-ft swells. On the 20th at 0600 the MAIN EXPRESS and TOYOFUJI No. 7 were near 47°N, 168°W with winds up to 43 kn and swell waves up to 17 ft. The KOREAN WONSSUN found 24-ft swells on the 23d near 54°N, 163°W. The storm moved into the Chukchi Sea late on the 23d.

An island station south of Tokyo and a 20-kn wind report with rain and falling pressure from the JLNP identified the formation of this frontal wave on the 21st. This storm tracked along the climatological storm track to the northeast. At 0000 on the 24th, the 1000-mb storm was near 44°N, 167°E. The PRESIDENT GRANT was about 3.5° longitude to the west with measured 44-kn northerly winds and 13-ft waves. Other ships both east and west of the center measured 37-kn winds. The THOMAS G. THOMPSON reported gales and 17-ft waves east of the center on the 25th (fig. 39).

The Pacific High was farther north than usual at this time and blocking eastward movement of the storm. The ILONA east of the center had 54-kn southerly winds and the DZYV about 600 mi to the south-southeast had light winds but 30-ft southwesterly swell waves. The storm tracked northward as it gradually weakened.

The Pacific High at 1034 mb was drifting eastward on the 21st. By the 23d it was 1038 mb near 47°N, 143°W. The WOLFE was northwest of San Francisco, close to the coast, and found 37-kn northerly winds. The SUGAR ISLANDER was west of the Farallon Islands with 35-kn winds and 17-ft waves on the 24th and the WOLFE sailing northwestward now had 42 kn. The HIGH was 1040 mb on the 25th near 49°N, 146°W. The MAYA PIONEER off Port Alice had only 25-kn winds but the waves were 20 ft. On the 26th several ships in the Gulf of Alaska had gale-force winds. The ARCO SPIRIT (52°N, 135°W) measured 45-kn winds with only 7-ft seas. The EXXON PHILADELPHIA (52°N, 136°W) reported 18-ft swell waves. The high-pressure cell started breaking down into multicells on the 27th.

Casualties--The WORLD MITSUBISHI drifted in heavy seas from typhoon Andy with a disabled engine. The IRON TRANSPORTER dragged anchor and grounded at Taiwan during Andy.

The BENVALLA sustained radio damage when struck by lightning off Singapore on the 15th. The CALYPSO N. and SINGAPORE 2 grounded in fog. The NAM SUNG No. 62 grounded on Rota Island on the 20th in heavy seas.

Other Casualties--The Canmar tank barge N.T. 1516 had contact damage at Tarsiut Island N.W.T. The AL RUBAYIA, JOO WAH, LANTAO ISLAND, MEADOWBANK, NEWHAVEN, and IRON SIRIUS all had heavy weather damage in the Indian or South Pacific Ocean.

WEATHER LOG, AUGUST 1982--A vast majority of the winds and waves listed in the Selected Wind and Waves Observation table were associated with tropical cyclones. Generally the extratropical cyclones were weak and few in number. There were three paths that could be considered primary storm tracks. One was over the northern Sea of Okhotsk, another was from the Tsugaru Strait east-northeastward to Nunivak Island, yet another was from near 48°N, 168°W to 50°N, 135°W. As a point of interest there was a secondary track from the Yana River area of Siberia northward toward the Pole. The strength, position, and tracks of the LOWs were very sensitive to the location of the high-pressure areas.

As shown by the monthly normal climatology, the sea-level pressure pattern was completely dominated by the Pacific High. This month it was 1027 mb centered near 39°N, 154°W, about 150 mi southwest of its normal location. There was an east-west trough over the western Bering Sea with a 1010-mb center over the Kamchatka Peninsula. This was about 600 mi west of its climatic normal counterpart and 2 mb higher (fig. 40).

The ocean north of latitude 20°N had average above normal sea-level pressures. The largest anomaly center was plus 6 mb over northwest Alaska. There was another plus 5-mb center near

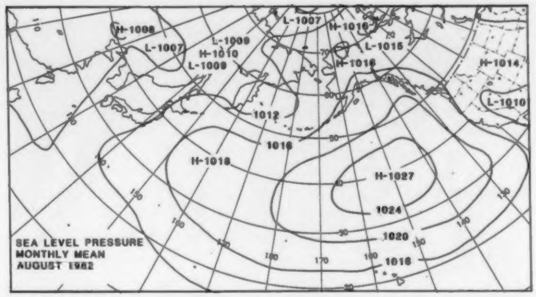


Figure 40.-- August mean sea-level pressure.

43°N, 157°W.

The heights and pattern of the 700-mb 30-day mean were close to climatology. The gradient was slightly tighter than normal. The HIGH near 35°N, 168°W was slightly higher but normally located. There was a ridge off Alaska becoming a trough off California as is usual. There was an anomalous slight ridging over Hokkaido and Sakhalin Island. The Low center was 2976 m near 60°N, 170°E. The heights over the Bering Strait were up to 60 m higher than normal.

There were five tropical cyclones over the western ocean, all typhoons: Cecil, Dot, Ellis, Faye, and Gordon. Tropical storm Akoni was over the central ocean. The eastern ocean hosted four tropical cyclones: hurricanes John, Kristy, and Miriam, and tropical storm Lane.

Extratropical Cyclones--As indicated previously, high pressure dominated the North Pacific this month as climatology indicates. The most important weather systems were the tropical cyclones.

During the first week the Pacific High started as 1040 mb and drifted eastward then westward near 40°N, 155°W. The last of the week it split into two centers. There was a LOW over the Gulf of Alaska.

During the second week the High split into three centers and by midweek was 1035 mb near the climatic normal position. There were weak LOWs in the northern latitudes and Bering Sea. The last of the week one large high-pressure cell stretched from coast to coast over the mid-latitudes.

Beginning the third week a 1037-mb High was near 48°N, 170°W with a few LOWs and/or frontal waves over the western mid-latitudes. In midweek high pressure covered most of the ocean from latitude 20°N to the Aleutians. The last of the week the High split into multiple centers with a LOW over the central ocean.

The fourth week the primary High was off Washington state. There was a series of LOWs and frontal waves from the Alaska Peninsula to Japan. The High weakened and drifted southward the end of the week, with another center east of Japan. By the last day of the month there were Highs over midocean and west of Oregon.

This LOW was the extratropical conversion of typhoon Bess. It had become extratropical by 1200 August 2 over the Sea of Japan. The winds had decreased to less than gale force but there

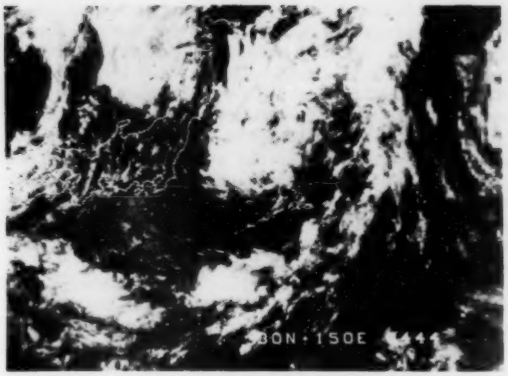


Figure 41.-- At 0445 the dying storm was near 39°N, 155°E.

were several wave reports of swell waves of 20 ft east of Honshu. Among the ships reporting were the HOEGH MIRANDA, HOHKOKUSAN MARU, and NEW WESTMINSTER CITY. On the 3d and 4th the MAYA PIONEER, in the vicinity of 38°N, 145°E, measured winds as high as 38 kn and waves up to 23 ft. This LOW rapidly dissipated but another formed to the south in the trough and tracked northeastward. The SEA-LAND ENDURANCE sailed almost directly through the relatively weak center at 0000 on the 6th (fig. 41) and measured 51-kn southwesterly winds. This center disappeared on the 6th.

This frontal wave originated south of the Aleutians between three high-pressure cells on the 2d. At 1200 on the 4th the storm was 1000 mb near 49°N, 142°W. The LEDA MAERSK near 45°N, 150°W had 40-kn winds and 17-ft waves. The GULF TRADER measured winds of 35 kn and waves up to 15 ft later on the 4th and the 5th. The KEYSTONE CANYON (44°N, 129°W) measured 50-kn winds at 1100. The storm died on the coast on the 6th.

This LOW burst upon the scene on the 0000 chart of the 5th south of Unimak Island between the Pacific High and another over the Bering Strait. It deepened rapidly and by 0000 on the 6th was 986 mb near 52°N, 155°W. At 1800 a ship near 44°N, 157°W measured 33-kn winds and 25-ft swell waves. At 1800 the HOKO MARU (52°N, 140°W) measured only 31-kn easterly winds but the swell wave report read easterly at 44 ft. The storm weakened on the 7th and was gone on the 9th.

This short-lived LOW existed for less than 72 hr. It formed near Mys Lopatka late on the 7th. At 1200 on the 9th it was 996 mb over the central Bering Sea. The NOAA DISCOVERER was near 52°N, 176°W, north of Adak Island and measured 42-kn westerly winds. The sister NOAA ship SURVEYOR was near 57°N, 173°W on the 10th with 43-kn westerly winds (fig. 42). Later in the day the storm disappeared near Cape Romanzof.

The Sea of Okhotsk north of Hokkaido gave birth to this frontal wave late on the 9th. At 1200 on the 11th the SEA-LAND DEFENDER (44°N, 170°E) measured 38-kn southerly winds. By 1200 on the 12th the storm was 982 mb near 52°N, 170°E. Five

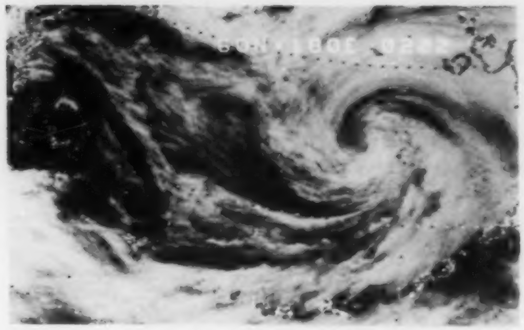


Figure 42.-- The SURVEYOR was just slightly south of the center at this time.

ships reported winds between 35 and 39 kn all around the storm. These continued into the 13th when the THOMAS G. THOMPSON (50°N, 175°E) found 20-ft waves. The storm was gone by the 15th.

This LOW formed on the 21st in the wake of another LOW that was dying out which already had a large circulation for this time of year. The STAR ENTERPRISE (38°N, 170°W) measured 39-kn winds. At 0000 on the 22d the storm was 984 mb near 49°N, 166°W (fig. 43). The BLUE OCEAN measured 40-kn southeasterly winds near 50°N, 162°W. The storm was moving northward and was 990 mb on the 23d. The NORTH STAR III measured 45-kn southerly winds with 8-ft seas and 36-ft swells in Bristol Bay. The storm dissipated south of Nunivak Island on the 25th.

Figure 43.-- This storm featured a strong- sharp cold front.

This was one of the longer lived storms of the month. It generated over the Sea of Japan on the 21st. The LOW passed south of Mys Lopatka on the 23d at 994 mb. The EASTERN ROYAL measured 37-kn winds. On the 24th, the SEA-LAND ENDURANCE (47°N, 178°W) measured 38-kn winds and 39-kn on the 25th. The LOW curved northeastward on the 25th and collapsed over Bristol Bay on the 27th.

Casualties--The UNIVERSE struck ice on the 16th in Columbia Bay, Alaska. The BUNGA SURIA, GRAY HERCULES, SEA-LAND FREEDOM, and SILVERFJORD all suffered heavy weather during unspecified

weather. The EASTERN PROGRESS encountered bad weather and heavy swell. She sank near 8°N, 108°E on the 28th. The AMERICAN TRADER and SEA-LAND DEVELOPER both suffered heavy weather damage in encounters with typhoon Ellis.

Other Casualties--The ARIANA contacted the DAMODAR TASAKA at Kutubdia on the 20th in bad weather. The COSMAS snapped mooring lines in heavy weather at Quintero Bay. The 251-ton 60-passenger ferry HASRAT MULIA capsized in heavy weather off the Sulawesi coast in the Makassar Strait on the 5th. There were 400 passengers reportedly aboard and about 300 perished. About 100 managed to cling to a plank for 13 hr before rescuers arrived.

WEATHER LOG, SEPTEMBER 1982--The storm traffic over the western half of the ocean was lighter than normal even for an early fall month. A short secondary track could be visualized from eastern Hokkaido to near 49°N, 173°E. Three secondary tracks from the south-southwest to the west-southwest fed into a primary track near 55°N, 160°W, then northward along the Alaska west coast. Climatology indicates a primary track from Honshu to the northern Gulf of Alaska with another short primary track from about 41°N, 180° to 51°N, 145°W.

The mean monthly sea-level pressure pattern was near normal except for central pressures and an anomalous high pressure center west of 180° near 37°N, 173°E. The Aleutian Low was 1003 mb near 61°N, 165°W, 3 mb lower and about 200 mi north of its normal position. The Pacific High was 1024 mb near 37°N, 145°W, 3 mb higher and about 150 mi north of its normal position (fig. 44).

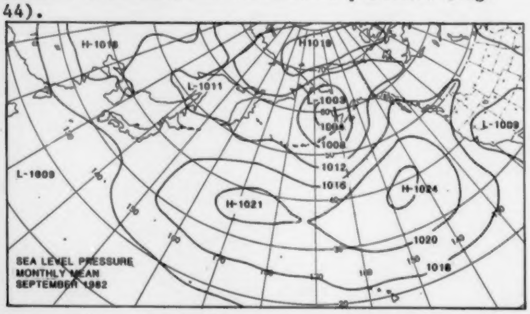


Figure 44.-- September mean sea-level pressure.

There was a minus 4-mb anomaly center over Cape Romanzof, a plus 5-mb anomaly center near 46°N, 142°W, and a plus 4-mb anomaly center near 41°N, 171°E. The vast majority of the ocean had positive anomaly values, except for the Bering Sea and a trough south to near 48°N, 165°W. The anomaly trough closely paralleled the primary storm track.

The upper air monthly mean at 700 mb indicated a trough interior of the Asian coast with another paralleling approximately longitude 168°W. There was also a trough off southern California. There was a closed Low of 2872 m near St. Lawrence Island which was deeper than usual. The usual ridge over western Canada and eastern Alaska was sharper and stronger than normal.

There were three tropical storms; Hope, Irving, and Lola, and two typhoons; Jody and Ken over the western ocean. Norman, Olivia, and Paul were hurricanes over the eastern ocean.

Extratropical Cyclones--The first week of the month there was a large 1033-mb HIGH over the central ocean near 43°N, 180°, with a weak Pacific High. The last of the week there was a large LOW near the Bering Sea. There was a significant LOW the first part of the second week with the HIGH moving eastward, and a strong Pacific High built near 40°N, 140°W. There were LOWs over the western ocean north of latitude 40°N that were forced northward near longitude 165°W.

The third week the Pacific high weakened with another High moving eastward along latitude 35°N. The LOWs were weak. Starting the fourth week, the LOWs were relatively strong over the northwestern ocean but generally weakened last of the month as the Pacific High consolidated and intensified.

This first significant extratropical LOW formed over eastern Siberia late on the 3d. At 0600 on the 5th, the MARSHAL MALINOVSKIY had 45-kn southeasterly winds north of Port Moller. At 0000 on the 6th the storm was 984 mb near Bethel, Alaska. Several ships had gales. The WESTWARD VENTURE off Craig, Alaska, had 40 kn. The Coast Guard Cutter IRONWOOD east of Kodiak had northwesterly 36-kn winds. At 1800 the CHEMICARRY No. 6 measured 54-kn westerly winds near 46°N, 162°W. Several ships around the storm had gales and waves over 20 ft on the 7th. The NORTH STAR III had 50-kn northerly winds near Saint Lawrence Island and the OHMINESAN MARU, east of Saint Paul Island, had 26-ft waves. The storm was weakening on the 8th and dissipated on the 9th.

This was the extratropical conversion of typhoon Gordon. By 1200 on the 5th his conversion from a warm core to cold core cyclone appeared to be complete (fig. 45). At that time the PRESIDENT GRANT (37°N, 155°E) southeast of the center had 40-kn southerly winds with 28-ft swells which continued into the 6th. Quite a few ships had winds of 35 to 45 kn and waves up to 20 ft on the 6th and 7th. By 0000 on the 8th the 980-mb storm was near 50°N, 167°E. The PACMERCHANT measured 50-kn northeasterly winds about 150 mi northeast of center. The LA COSTA had 45 kn and 20-ft swells and 8KUY was pounded by 25-ft swells.

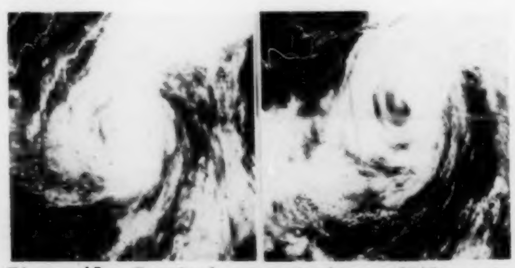


Figure 45.--Tropical storm Gordon at 0345 on the 5th (left) and extratropical Gordon at 0345 on the 6th (right).

On the 9th the storm started weakening and racing toward the east. It disintegrated in the coastal mountains of Canada on the 12th.

This storm formed over the Kurile Trench east of Hokkaido on the 10th. There were a few gales on the 11th. The CLARA MAERSK, northwest of the center at 1900 on the 12th, sent a special observation of 45-kn winds, 20-ft seas, and 25-ft swells. The storm was tracking southeastward on the 13th, but shifted northeastward on the 14th. The PRESIDENT HOOVER was near 43°N, 177°E, at 0600 on the 13th with 49-kn winds and 17-ft waves, which were 26 ft 24 hr later near 41°N, 174°W. The storm was 984 mb near 43°N, 168°W at 0000 on the 14th. The storm was traveling northward over the Alaska Peninsula on the 15th, but the PRESIDENT HOOVER still measured 36-kn northwesterly winds and 25-ft swells on the 15th. The BARBER TSU (42°N, 155°W) measured 55-kn southwest winds east of the front. The MILLER FREEMAN (56°N, 161°W) felt gales on the 16th as the storm headed for the Seward Peninsula and interior Alaska.

Another storm with tropical origins was typhoon Judy. She was extratropical on the 13th on the east coast of Hokkaido. The storm weakened as it moved over Japan but reintensified over the Kurile Islands on the 14th. A Japanese ship east of Mys Lopatka had 40-kn gales and 23-ft swells. At 1200 the LOW was 980 mb over Mys Lopatka. Ostrov Urup measured 45 kn. On the 15th the CLARA MAERSK (45°N, 164°E) found 58-kn winds, 33-ft seas, and 35-ft swells. The storm was now caught in the zonal flow and raced eastward. The DOMINIA (43°N, 175°W) measured 50-kn northwesterly winds on the 16th and 17th. Waves up to 25 ft were being reported. Winds as high as 50 kn were still being found on the 18th with waves up to 28 ft as the 990-mb storm crossed the Alaska Peninsula. It dissipated on the 20th over the Kotzebue Sound.

Monster of the Month--An inverted trough southeast of Tokyo was the instigator of this storm on the 14th. It moved slowly northeastward as an open wave until the 17th when it picked up some speed. On the 20th the storm was a weak 998-mb LOW south of Unimak Island in an area of general low pressure with three other centers. At 1200 on the 20th it was just north of Cold Bay. By 0000 on the 21st it had absorbed all the other low-pressure centers and consolidated into a large 988-mb circulation. The storm was drifting northward and was 972 mb at 1200 and 978 mb at 0000 on the 22d near 63°N, 167°W.

At 1200 on the 21st the KASHIMA MARU (57°N, 167°W) had westerly 49-kn winds and 20-ft swell waves. At 1800 they were 45 kn and, at 0000 on the 22d, 36 kn with the swell remaining 20 ft throughout the time.

On the 21st the tug/supply vessels OCEAN RAY and BIEHL TRAVELER were towing the jack-up drilling rig KEY SINGAPORE south from Norton Sound to Dutch Harbor. About 2200 the tow line of the BIEHL TRAVELER broke, off Hazen Bay, in winds near 50 kn and waves of 25 ft (fig. 47). The 39 crew-

Figure 47.-- This image was taken 2 1/2 hr after the tow line of the KEY SINGAPORE broke.

members were all rescued by helicopters. The KEY SINGAPORE grounded northeast of Nunivak Island on the 22d, and the crew reboarded with winds of 45 kn and 23-ft seas going over the deck. The tow to Dutch Harbor continued when the weather subsided. At 1800 on the 22d the DISCOVERER (63°N, 169°W) measured 36-kn winds with only 5-ft seas. On the 23d at 0000 the storm was 992 mb over the Bering Strait, but the next storm was moving into the area.

This frontal wave came out of Shanghai on the 18th on a front that had pushed south to near latitude 30°N. It moved over Japan as another LOW moved over the northern Sea of Japan. By 1200 on the 22d the frontal wave absorbed both circulations near 46°N, 152°E, at 980 mb. Gales had started blowing on the 21st. The fishing fleet along the Kuriles had gales on the 22d. The storm was 974 mb near 53°N, 165°E, at 0000 on the 23d. The TOZUI MARU (47°N, 170°E) measured 40-kn southwesterly winds with 33-ft swell waves.

This was a large storm but the gradient was fairly loose with resulting lighter winds in general. At 1800 on the 24th the PRESIDENT FILLMORE (53°N, 175°E) had light 28-kn winds with 12-ft seas and 25-ft swells. On the 24th the center turned westward as a new center to the east moved northward. This spelled the end of the system.

Casualties--The tanker HAWAIIAN SEA lost her anchor at Barbers Point while attempting to moor in adverse weather. The barge KOKO lost six 20-ft vans overboard off southeast Alaska. The cargo vessel WAKABA MARU developed a list on September 2 in heavy weather.

Other Casualties-- The bulkcarrier TOLGA encountered heavy weather the 27th to 29th off Australia and damaged machinery. The LASH barge WA-1-0050 was aground at Chittagong after mooring ropes parted in a cyclonic storm on the 29th.

Hurricane Alley

Dick DeAngelis
National Environmental Satellite Data and Information Service
Washington, D.C.

The tropical cyclone tracks (fig. 48)and summaries that follow are based on information provided by the National, Eastern Pacific, and Central Pacific Hurricane Centers, the Naval Environmental Prediction Research Facility and the Joint Typhoon Warning Center. Table 8 covers the entire year.

TROPICAL CYCLONES--JULY 1982

Activity was close to normal during July with the formation of 10 tropical cyclones, six of which reached hurricane or typhoon strength. These storms developed in the North Pacific (table 9). The strongest storm of the month was supertyphoon Bess which sprang to life on

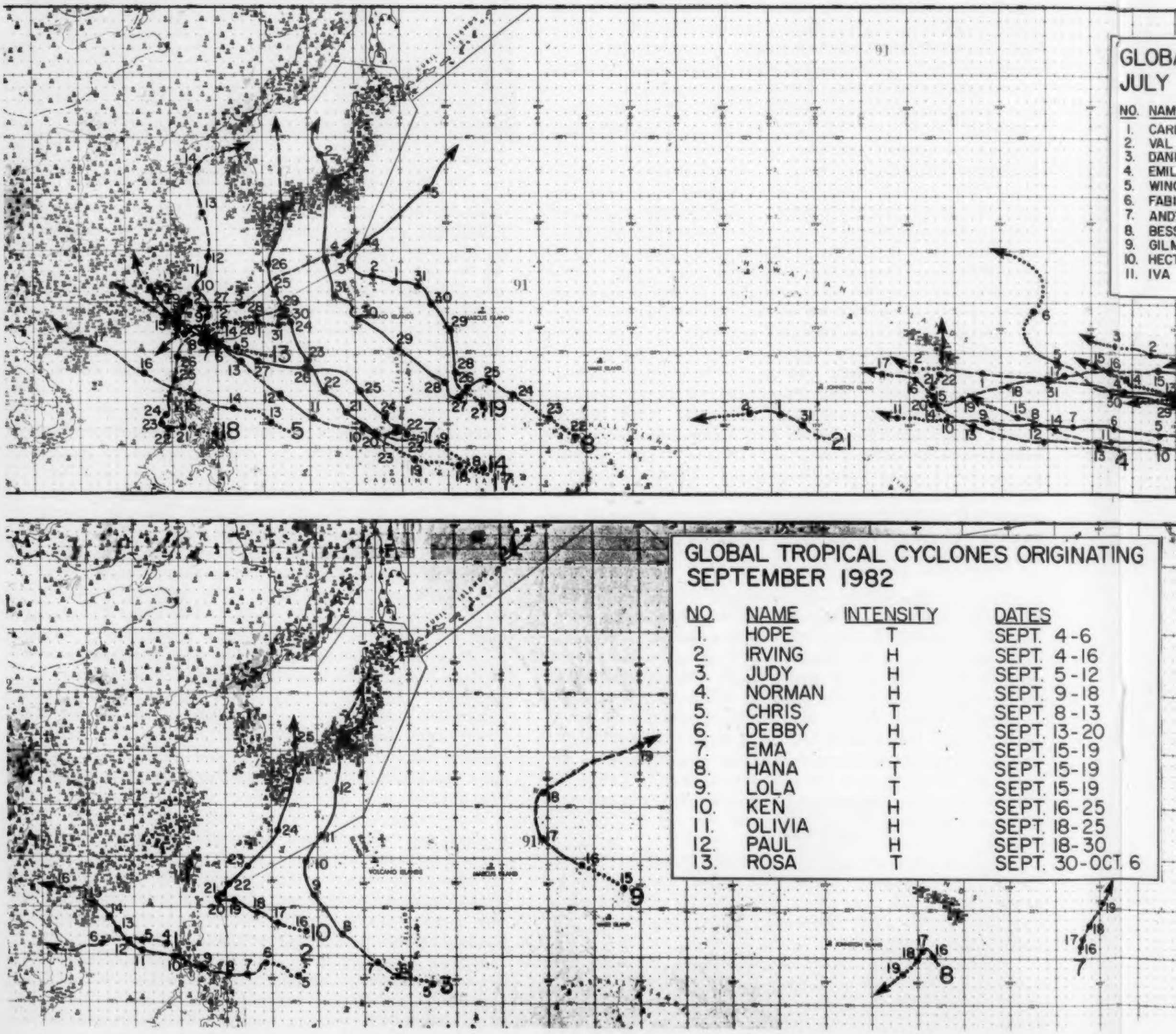
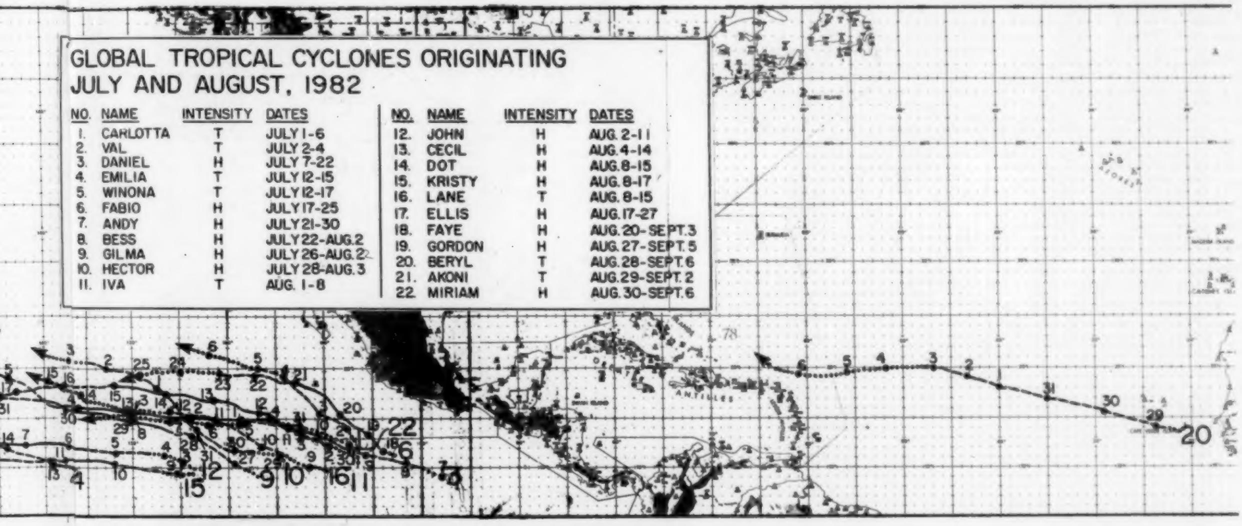
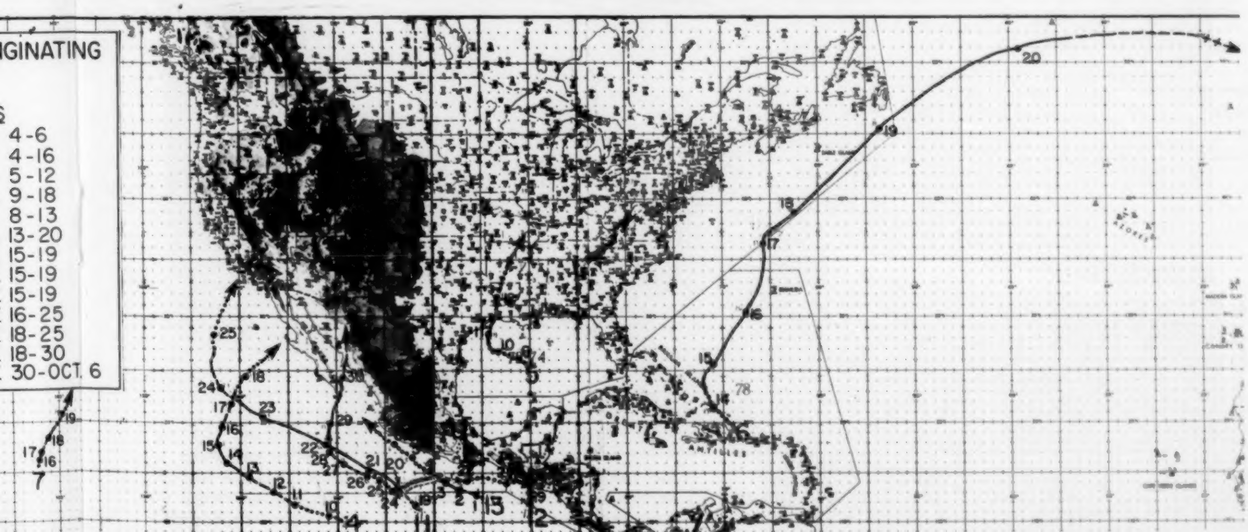


Figure 48.-- Tropical cyclone tracks for July, August, and September 1982.

the 22d, in the western waters, among the Marshall Islands. Bess reached typhoon strength on the 24th and climbed to supertyphoon status on the 29th; she retained this intensity until the 30th. On the 29th maximum winds climbed to 140 kn around her center, which was located south of the Volcano Islands. The GLOMAR CHALLENGER passed very close to the storm's center on the 1st. At about 0930 she recorded a 968.3-mb pressure (fig. 49). Windspeeds were running 35 to 47 kn with seas of about 16 ft (fig. 50).

Bess caused more havoc as she approached Honshu. The AUSTRALIAN EXPLORER suffered heavy weat' er damage enroute from Yokohama to Sydney on the 1st, while the 43-ft yacht LADY LEE dispatched an SOS and had to be taken in tow. There were several incidents in and around Tokyo Bay on the 2d. The SEIYO MARU ran aground near the Daikoku breakwater while an empty tanker, the NIKKO MARU struck the breakwater. The VENUS ISLAND collided with the container vessel FUCHUN, both anchored in Tokyo Bay. The BANGLAR PREETI collided with the SOUTHERN CROSS II while the LADYBIRD and HUANG PUJIANG collided, both off Yokohama. The KATMON grounded near Detamachi Pier while the HANG HOU and OCEAN VICTORIA collided at Shimizu. As Bess moved across central Japan





1982.

Table 8.--Tropical cyclone watch, 1982.

Western North Pacific

Mamie	TC-1	T	March
Nelson	TC-2	H	March
Odessa	TC-3	H	March
Pat	TC-4	H	May
Ruby	TC-5	H	June
Tess	TC-6	T	June
Skip	TC-7	T	June
Val	TC-8	T	July
Winona	TC-9	T	July
Andy	TC-10	H	July
Bess	TC-11	H	July
Cecil	TC-12	H	Aug.
Dot	TC-13	H	Aug.
Ellis	TC-14	H	Aug.
Faye	TC-15	H	Aug.
Gordon	TC-16	H	Aug.
Hope	TC-17	T	Sept.
Irving	TC-18	T	Sept.
Judy	TC-19	H	Sept.
Ken	TC-20	H	Sept.
Lola	TC-21	T	Sept.
Mac	TC-23	H	Oct.
Nancy	TC-24	H	Oct.
Owen	TC-26	H	Oct.
Pamela	TC-27	H	Nov.
Roger	TC-28	H	Dec.

Central North Pacific

Akoni	1-C	T	Aug.
Ema	2-C	T	Sept.
Hana	3-C	T	Sept.
Iwa	4-C	H	Nov.

North Indian Ocean

--	20-82	H	May
--	22-82	T	June
--	23-82	T	Oct.

North Atlantic

Alberto	H	June
--	T	June
Beryl	T	Aug.
Chris	T	Sept.
Debby	H	Sept.
Ernesto	T	Oct.

Eastern North Pacific

Aletta	Td-1	T	May
Bud	Td-4	T	June
Carlotta	Td-6	T	July
Daniel	Td-8	H	July
Emilia	Td-9	T	July
Fabio	Td-12	H	July
Gilma	Td-13	H	July
Hector	Td-14	H	July
Iva	Td-15	T	July
John	Td-16	H	Aug
Kristy	Td-17	H	Aug.
Lane	Td-18	T	Aug.
Miriam	Td-19	H	Aug.
Norman	Td-20	H	Sept.
Olivia	Td-23	H	Sept.
Paul	Td-22	H	Sept.
Rosa	Td-24	T	Oct.
Sergio	Td-25	H	Oct.
Tara	Td-26	T	Oct.

Australia-South Pacific

Bruno	5-82	T	Jan.
--	6-82	T	Jan.
Hettie	7-82	H	Jan.
Abigail	8-82	H	Jan.
Graham	9-82	T	Feb.
Harriet	11-82	T	Feb.
Ian	13-82	H	Feb.
Isaac	14-82	H	March
Bernie	17-82	H	April
Dominic	18-82	T	April
Claudia	21-82	T	May
Joti	02S-83		Oct.
Lisa	05S-83	T	Dec.

South Indian Ocean

--	1-82	T	Jan.
Chris	2-82	H	Jan.
Daphne	3-82	T	Jan.
Errol	4-82	T	Jan.
Electra	10-82	T	Feb.
--	12-82	T	Feb.
Justine	15-82	H	March
--	16-82	T	March
Karla	19-82	H	April
--	15-83	T	July
--	25-82	T	Nov.
Bemany	04S-83	H	Dec.
Dadafy	06S-83	H	Dec.

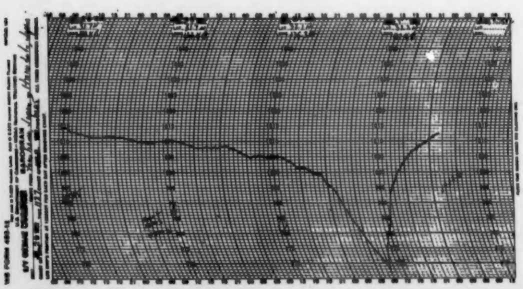


Figure 49.--The barogram of the GLOMAR CHALLENGER shows the 968.3 pressure in typhoon Bess.

Table 9.--Global tropical cyclone summary July, August, and September 1982.

No.	Name	Est. max. wind (kn)	Basin	Dates
		July 1982		
1	Carlotta	50	E. North Pacific	1-6
2	Val	55	W. North Pacific	2-4
3	Daniel	100	E. North Pacific	7-22
4	Emilia	55	E. North Pacific	12-15
5	Winona	55	W. North Pacific	12-17
6	Fabio	70	E. North Pacific	17-25
7	Andy	120	W. North Pacific	21-30
8	Bess	140	W. North Pacific	22-Aug. 2
9	Gilma	110	E. North Pacific	26-Aug. 1
10	Hector	65	E. North Pacific	29-Aug. 3
		August 1982		
11	Iva	35	E. North Pacific	1-8
12	John	100	E. North Pacific	2-10
13	Cecil	125	W. North Pacific	4-14
14	Dot	80	W. North Pacific	8-15
15	Kristy	80	E. North Pacific	8-16
16	Lane	55	E. North Pacific	8-15
17	Ellis	125	W. North Pacific	17-27
18	Faye	90	W. North Pacific	20-Sept. 3
19	Gordon	100	W. North Pacific	27-Sept. 5
20	Beryl	63	North Atlantic	28-Sept. 5
21	Akoni	45	C. North Pacific	29-Sept. 2
22	Miriam	75	E. North Pacific	30-Sept. 6
		September 1982		
1	Hope	60	W. North Pacific	4-6
2	Irving	90	W. North Pacific	4-16
3	Judy	90	W. North Pacific	5-12
4	Norman	90	E. North Pacific	9-18
5	Chris	55	North Atlantic	9-13
6	Debby	115	North Atlantic	13-20
7	Ema	40	C. North Pacific	15-18
8	Hana	35	C. North Pacific	15-18
9	Lola	50	W. North Pacific	15-19
10	Ken	110	W. North Pacific	16-25
11	Olivia	125	E. North Pacific	18-25
12	Paul	95	E. North Pacific	18-30
13	Rosa	45	E. North Pacific	30-Oct. 6

torrential rains and mudslides were responsible for at least 75 deaths; thousands of people were left homeless. In the hills of Nara Prefecture 28 in of rain fell in 24 hr.

While Bess was churning up the waters off Japan, another powerful typhoon--Andy--was causing problems in the Philippines and Taiwan. On the 28th the EASTERN HONOUR, from Tanjong Mani to Tokyo, sank near 25°35'N, 127°35'E. The 26 crewmen were lifted to safety by the Japan Maritime Safety Agency's helicopter. Nearby, the following day, the supertanker WORLD MITSUBISHI became disabled until the 2d when power was restored. On the 28th the vessel EIGHT STAR was abandoned in Balintang Channel. The ship was carrying 4,850 tons of ammonium sulphate. It took water in the No. 1 hold and was listing badly. At last report the crew was still missing. Winds around Andy's center remained above 100 kn from the 26th through the 28th, reaching a peak of 120 kn late on the 27th and early on the 28th. The IRON TRANSPORTER, which had left Kaohsiung on the 26th to anchor outside the port, while Andy passed, dragged anchor and ran aground. The GRAY AMAZON tug pulling the barge SELCO-27 had an engine failure and the tow rope broke on the 29th. The tug suffered minor heavy weather damage and the barge was found and towed to its destination. In the Philippines some 227 people were reported killed with 94 missing and 52,000 homeless in floods and landslides.

The other western North Pacific storms in July,

Figure 50.--Ominous seas crash into the GLOMAR CHALLENGER during typhoon Bess.

Val and Winona, were both tropical storms with maximum winds of 55 kn. Six storms developed in eastern waters. Three of these moved close enough to the Hawaiian Islands to affect its weather.

Emilia formed much farther west than Daniel and was earlier arriving in the Hawaii region. Daniel reached hurricane intensity on the 9th and maintained it until the 15th. Peak winds were 100 kn on the 11th. Emilia formed west of 135°W, near 10°N, on the 12th and headed west-northwestward for the islands. She remained a tropical storm through the 14th, drawing moisture from the Intertropical Convergence Zone (ITCZ). However, on the 15th Emilia weakened rapidly as she approached a cold upper trough lying over the islands. Emilia continued to weaken as her remnants were carried westward along the 16th parallel. A small vortex eventually crossed Johnston Island on the 19th, producing brief, heavy showers there. The moisture injected into the upper trough by Emilia also produced some heavy rains on sections of the big island of Hawaii. Several 3-day totals in the 12- to 24-in range were reported on the slopes north-west of Hilo from the 16th through the 18th. Maui also reported heavy showers on the 16th.

Daniel, meanwhile, was crossing 140°W near 18°N on the 16th. He remained a minimal tropical storm until just south of the Big Island on the 19th when he was downgraded to a tropical depression. On the 19th and 20th, Daniel briefly moved under a small upper level HIGH and reintensified. Early on the 22d the weakening system passed within 30 mi of the Kona coast and slipped north-eastward through the Alenuihaha Channel between Hawaii and Maui. While Daniel was located south-west of the Big Island on the 21st and early on the 22d, heavy thunderstorms occurred over a large area northeast of the center, including Hawaii and Maui. Short period rainfall totaled 4 to 8 in on the Big Island. Flash flooding occurred in the Hilo area after a 3-in downpour; about 2 in fell in 40 min.

After a week of mostly fair weather, hurricane Gilma appeared on Hawaii's horizon. Gilma moved into the Central Pacific area on the 29th as the remnants of former hurricane Fabio passed harmlessly to the south of the Big Island. Fabio spent most of his active life east of 130°W, where he developed maximum winds of 70 kn. Gilma had been an intense hurricane with maximum sustained winds climbing to 110 kn in the 24-hr period before moving over cooler waters near 140°W. By the 31st Gilma weakened to minimal tropical storm strength. On August 1 she passed about 60 mi south of South Point while dropping to depression strength. Rainfall associated with Gilma occurred in heavy showers and thunderstorms mainly north-east of her center. Rains on Maui totaled 10 in on the north slopes of Haleakala. High surf was a problem from Hilo Bay southwestward to South Point. One fatality occurred when an elderly fisherwoman was swept off a rocky ledge and into the surf. High water associated with higher than normal tides contributed to the need for evacuation of some families from exposed areas near Vacationland on the Puna peninsula. Surf heights may have reached 15 to 20 ft along the Puna and Kau coast as Gilma passed to the south.

Of the other two eastern Pacific storms, Carlotta formed on the 1st day of the month and reached tropical storm strength while Hector developed on the 29th and became a hurricane.

TROPICAL CYCLONES--AUGUST 1982

Twelve tropical cyclones developed during August, which is normal. Eight of these systems reached hurricane or typhoon strength. Only one --tropical storm Beryl--formed in the North Atlantic; the rest came to life in the North Pacific.

Beryl developed from a system, which moved off the African coast on the 27th. She reached tropical storm strength on the 28th just south of the Cape Verde Islands. On the 1st Beryl neared hurricane strength as maximum sustained winds climbed to 63 kn around a 988-mb pressure center. During the period that Beryl was roaming the North Atlantic, typhoon Gordon was developing in the western North Pacific while Akoni and Miriam were coming to life east of the dateline. Miriam attained hurricane strength on the 31st after crossing the 115th meridian. Maximum winds climbed to 75 kn late on the 2d and remained at that level until the 4th. Miriam crossed into the central Pacific on the 4th, turned northward, and dissipated before affecting the Hawaiian Islands. Akoni was a true central Pacific storm, forming south of Johnston Island on the 30th. However, maximum winds reached only 45 kn before the storm dissipated. However, Gordon reached typhoon strength on the 28th east of the Mariana Islands and maintained that intensity into the 5th as he recurved before reaching Japan. Maximum winds climbed to 100 kn on the 29th and 30th.

While Gordon was an intense storm, typhoons Cecil, Ellis, and Faye seemed to have more of an effect upon shipping. Cecil, with maximum winds of 125 kn on the 8th, brushed Taiwan before moving through the East China Sea, Yellow Sea, and into Korea. On the 9th the WORLD COSMOS, Toyohashi for Singapore, with 31 crewmen grounded off Iriomoteshima in heavy seas. The crew was rescued by the Japanese Maritime Safety Agency as 14 tanks were holed. Torrential rains outside Taipei resulted in landslides which were responsible for at least 19 deaths. Some 9.6 in of rain fell in 32 hr in Taipei.

The SEALAND PATRIOT bound for Yokohama encountered rough weather on the 9th just northeast of Cecil's center. Maximum winds reached 55 kn with a pressure of 985 mb in 15-ft swells, at 0900 on the 9th. Heavy rains were also a problem in South Korea where up to 19.8 in. of rain fell in some areas. Floods and landslides were responsible for an estimated 20 deaths. Hardest hit areas were Sanchong and Changwon southeast of Seoul. Some 4,000 people were left homeless.

Cecil was followed by typhoon Dot who generated 80 kn winds in the Philippine Sea on the 11th. However, she moved across southern Taiwan as a tropical storm on the 14th bringing more torrential rains to that already beleaguered island. Ellis matched the 125 kn winds of Cecil on the 23d as he headed for southern Japan. On the 26th and 27th the AMERICAN TRADER and SEALAND DEVELOPER

both suffered minor heavy weather damage from the storm. Torrential downpours in southwestern Japan on the 26th and 27th resulted in flooding and five people were killed. A short time later South Korea was once again pummeled by heavy rains resulting in floods and landslides which were responsible for six deaths and 5,000 homeless in the eastern part of the country. Meanwhile typhoon Faye had developed in the Philippine Sea and was intensifying as she moved northward, skirting the west coast of Luzon. On the 25th the motor vessel SIGMA grounded near Port Sual but was refloated 2 days later. Earlier, on the 22d and 23d the tug GRAY HERCULES towing the barge SELCO GIANT I was battered by rough seas and strong winds. They suffered only minor damage but lost a number of drums of fuel and lubricating oil. On the 28th the motor vessel BANGA sank after an encounter with Faye. Faye's winds peaked at 90 kn on the 24th. The PRESIDENT POLK was just west of Faye's center at this time and recorded a 978-mb pressure (fig. 51).

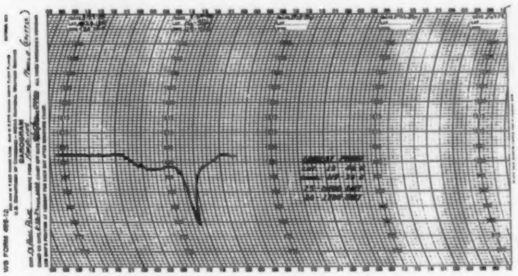


Figure 51.--The barogram of the PRESIDENT POLK shows 978 mb at 1700 on the 24th in typhoon Faye.

In the eastern Pacific, Iva and John developed at the beginning of the month. However, Iva, which formed to the east of John, was mainly a depression except for a short period on the 2d when winds climbed to 35 kn. John attained hurricane strength on the 5th and his winds soared to 100 kn on the 6th and 7th in central Pacific waters. Another hurricane that moved into the central Pacific waters was hurricane Kristy. Kristy generated maximum winds of 65 kn on the 10th, weakened to tropical storm strength, then reintensified west of 150°W. Kristy slowed and headed northwestward on the 14th. Winds were once again at hurricane intensity. Maximum winds reached 80 kn late in the day; however, she began to weaken and headed west-northwestward the following day. While Kristy was plying central Pacific waters, tropical storm Lane was on a west-northwest course farther to the east. Lane's winds reached 55 kn on the 10th. He dissipated on the 15th--one day earlier than Kristy.

TROPICAL CYCLONES--SEPTEMBER 1982

Some thirteen tropical cyclones came to life in September, and seven of them reached hurricane or typhoon strength. This is very close to normal. As in the past 2 mo, activity was confined to the Northern Hemisphere.

Tropical storm Hope along with typhoons Irving and Judy developed during the first week in western Pacific waters. Irving and Judy both generated maximum winds of 90 kn while Hope's winds reached 60 kn on the 9th. Hope had a brief life, forming just west of Luzon on the 4th then moving westward across the South China Sea to Vietnam by the 6th. Irving developed in the Philippine Sea and moved across the central Philippines as a tropical storm on the 8th and 9th. In his wake the following vessels were stranded along the Batangas coast: CENTRAL CEBU, PETROPARCEL, LUMBERJACK, GULF ACE, and GULF QUEEN. The motor vessel TAI YUIN was stranded between Mindoro and Busuanga Islands. Torrential rains triggered floods and landslides, which were responsible for 37 deaths, including 9 members of one family. The motor vessel BLACK DOUBLE which had run aground inside Looc Bay, west of Samar Island, on the 8th, was refloated on the 17th. Irving moved into the South China Sea on the 10th about the time typhoon Judy was nearing the 25th parallel and heading for Honshu. Her winds had peaked at 90 kn on the 9th and were now down to 80 kn. Irving, however, was regaining his strength over the warm South China Sea waters. By the 11th he was at typhoon intensity and the following day was generating 90-kn winds. By this time Judy was moving across Honshu bringing strong winds and torrential rains to central Japan. Floods swept away 46 bridges between Osaka and Hokkaido while landslides and floods were responsible for 25 deaths with 9 people missing. Late on the 14th Irving moved across the Luichow Peninsula and into southern China.

The eastern North Pacific spawned four tropical cyclones during the month--Norman, Olivia, Paul, and Rosa. Norman was the earliest and developed farthest west on the 9th. He developed 90-kn winds on the 14th but soon began to move northeastward over cooler waters on a typical September track. Olivia and Paul both formed on the 18th about 700 mi apart. Paul made landfall rather quickly by the 20th. He brought torrential rains to El Salvador and Guatemala. A disaster occurred when past of a hillside, loosened by the heavy rains, slid down and buried the San Salvador suburb of Montebello. At Champerico, Guatemala, two fishing vessels sank and one was beached. Rains had occurred over an 8-day period leaving more than 600 dead in each country with many more missing and more than 30,000 homeless. Hardest hit were the towns of Chiquimililla, Taxisco, Moyuta, and Pedro Alvador. The port of San Jose was closed for an estimated 2 mo.

Meanwhile Olivia had reached hurricane intensity and was heading rapidly toward the west-northwest. Her winds climbed to 125 kn late on the 21st and remained above 100 kn through the 22d. However by the 24th Olivia was at tropical storm strength and swinging northward over colder waters. Paul however was not finished. He weakened by the 22d to an unorganized system but 2 days later had regenerated. By the 27th Paul was at hurricane strength. His maximum winds reached 95 kn on the 29th as he clipped the Baja Peninsula. The following day Paul was ashore about 20 mi south of Los Mochis. Torrential

rains and strong winds in northern Mexico isolated some 400,000 people in two cities, leaving 140,000 homeless. High tides and 15-ft waves swamped boats and flooded coastal areas. Five deaths were reported.

Far to the west, a few days prior to Olivia and Paul, Ema, and Hana developed in central Pacific waters. Both came to life on the 15th. Ema moved north-northeastward while Hana moved northwestward then turned toward the southwest. Both were short-lived systems with Hana generating a maximum of 35 kn winds on the 17th and 18th compared to Ema's 40-kn winds on the 16th and 17th.

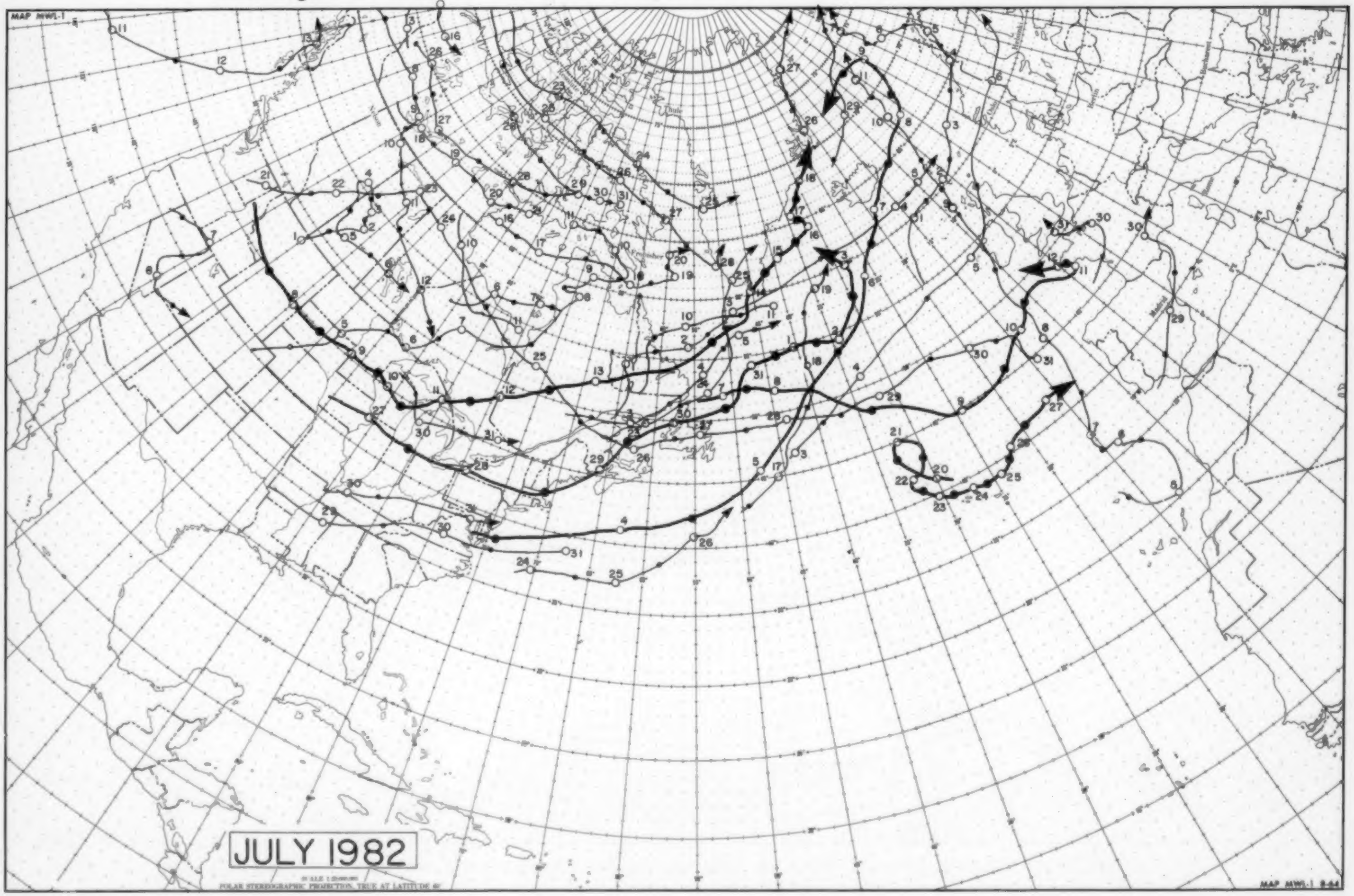
The North Atlantic saw tropical storm Chris develop in the northern Gulf of Mexico and hurricane Debby came to life off the Dominican Republic during September.

Chris, which developed from an upper level LOW, was guided northward by an eastward-moving, large-scale, low-pressure trough. Maximum sustained winds were estimated at 55 kn with offshore oil rigs reporting gusts up to 70 kn. The storm reached its maximum strength near the coast with a low pressure of 994 mb. Only its inland movement prevented Chris from becoming a hurricane. Highest tides were 5 to 6 ft above normal just east of the center, while rainfall amounts of 5 to 10 in were observed in Louisiana. Moisture from the storm contributed to heavy rains in Tennessee and Kentucky where local rainfall amounts of up to 16 in were reported. There were no casualties and property damage was minimal. Several large boats were sunk or badly damaged. Some 6,500 residents were evacuated from the Louisiana coast and many oil workers were taken off nearby oil rigs.

Debby began as a disturbance that moved off the African coast back on the 3d. The wave was tracked across the Atlantic, but it wasn't until the 13th that a 1010-mb circulation center was located by Air Force reconnaissance just north of the Dominican Republic. An upper trough guided Debby northward and away from the United States. She reached hurricane strength on the 15th and headed toward Bermuda. Debby's pressure fell to 966 mb but a slight shift in her course took her center 80 mi to the west of the island. Bermuda police reported that strongest wind gusts were about 60 kn, which caused limited power outages, fallen trees, and some minor structural damage. Early on the 18th, Debby's central pressure reached a low of 949 mb and winds reached a peak of 115 kn. From this time on, the hurricane was caught in a swift flowing, slightly anticyclonic, upper air pattern and accelerated to a forward speed of near 50 kn by the 20th. A steady filling process had begun shortly after the 949-mb pressure was observed. By the morning of the 20th, she was a tropical storm and by that afternoon was enveloped by a major storm system over the British Isles.

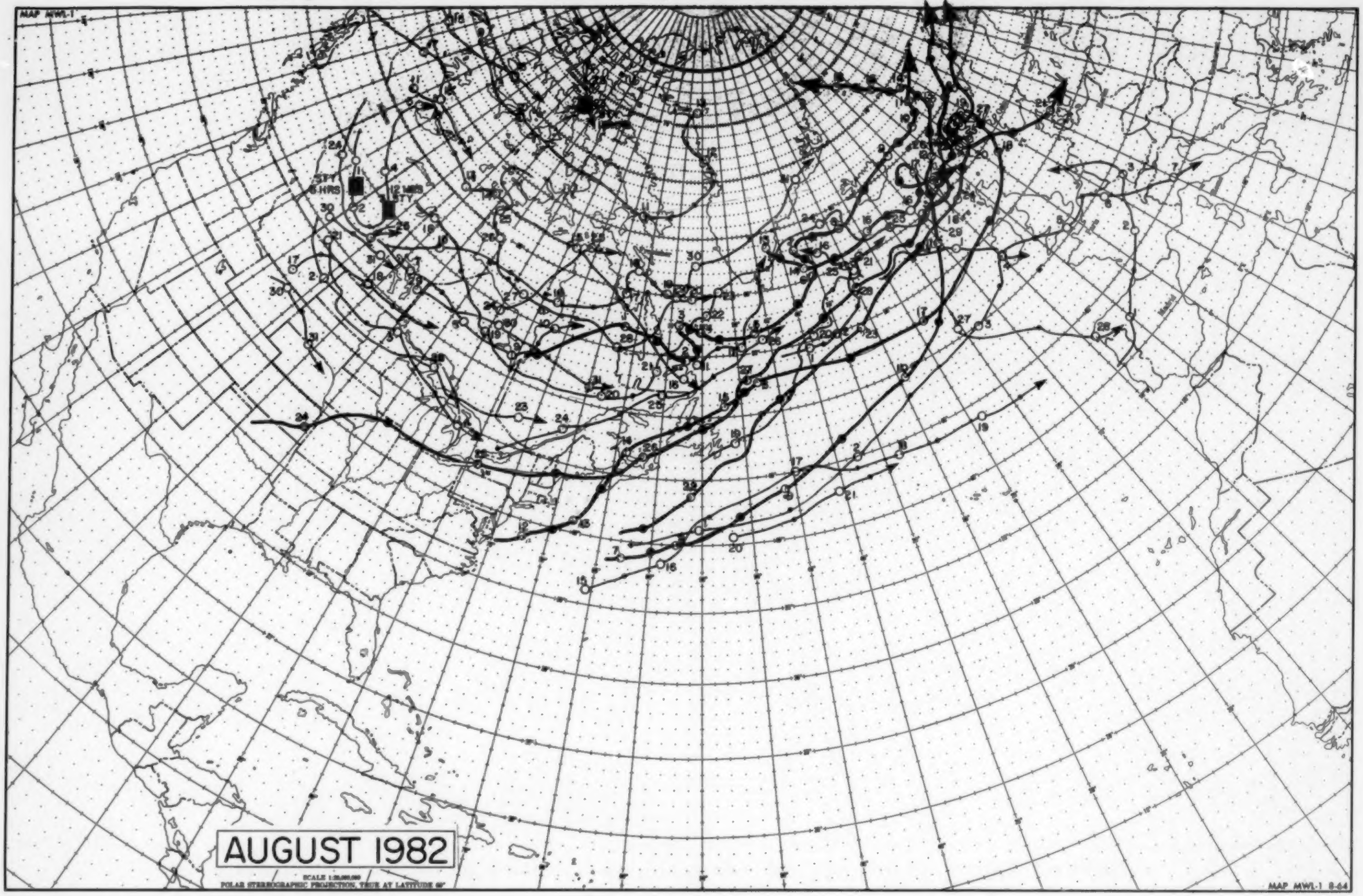
In the western North Pacific, tropical storm Lola and typhoon Ken developed within 1 day of each other. However, Lola popped up north of Wake Island and remained over the open Pacific for her 5-day life. Maximum winds climbed to 50 kn on the 17th. Ken meanwhile came to life in the Philippine Sea and reached typhoon strength by the 17th. By the 19th Ken was generating 110 kn winds as he approached the Bashi Channel. However, the storm slowed and recurved, paralleling the Ryukyu Islands. Late on the 24th typhoon Ken moved across southwestern Honshu. Near the Jizozaki Lighthouse, the 391-ton NANKAI dragged anchor and collided with the 837-ton SHIMOYASU MARU No. 1. In Tokyo Bay the 5,582-ton YONG CHANG ran into the 199-ton SEIKO MARU, which sank; two crewmen were rescued but one was reported missing. On Shikoku and southern Honshu winds gusted to 115 kn while heavy rains triggered mudslides and flooding, which resulted in three deaths.

Principal Tracks of Centers of Cyclones at Sea Level, North Atlantic



Closed circle indicates 0000 and open circle 1200 GMT positions. Square indicates stationary center. Cyclone tracks marked with a heavy line are described in the Weather Log.

Principal Tracks of Centers of Cyclones at Sea Level, North Atlantic



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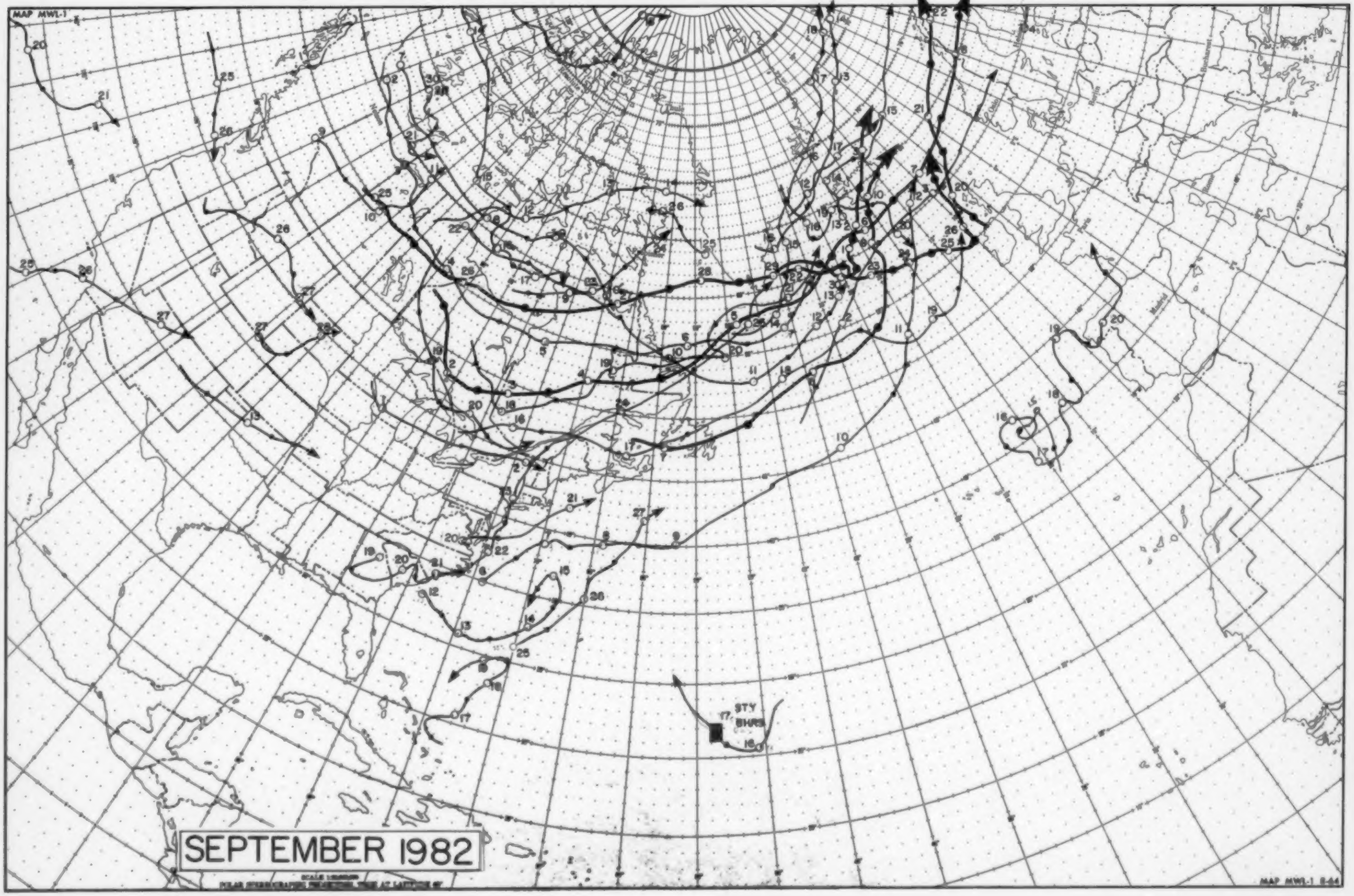
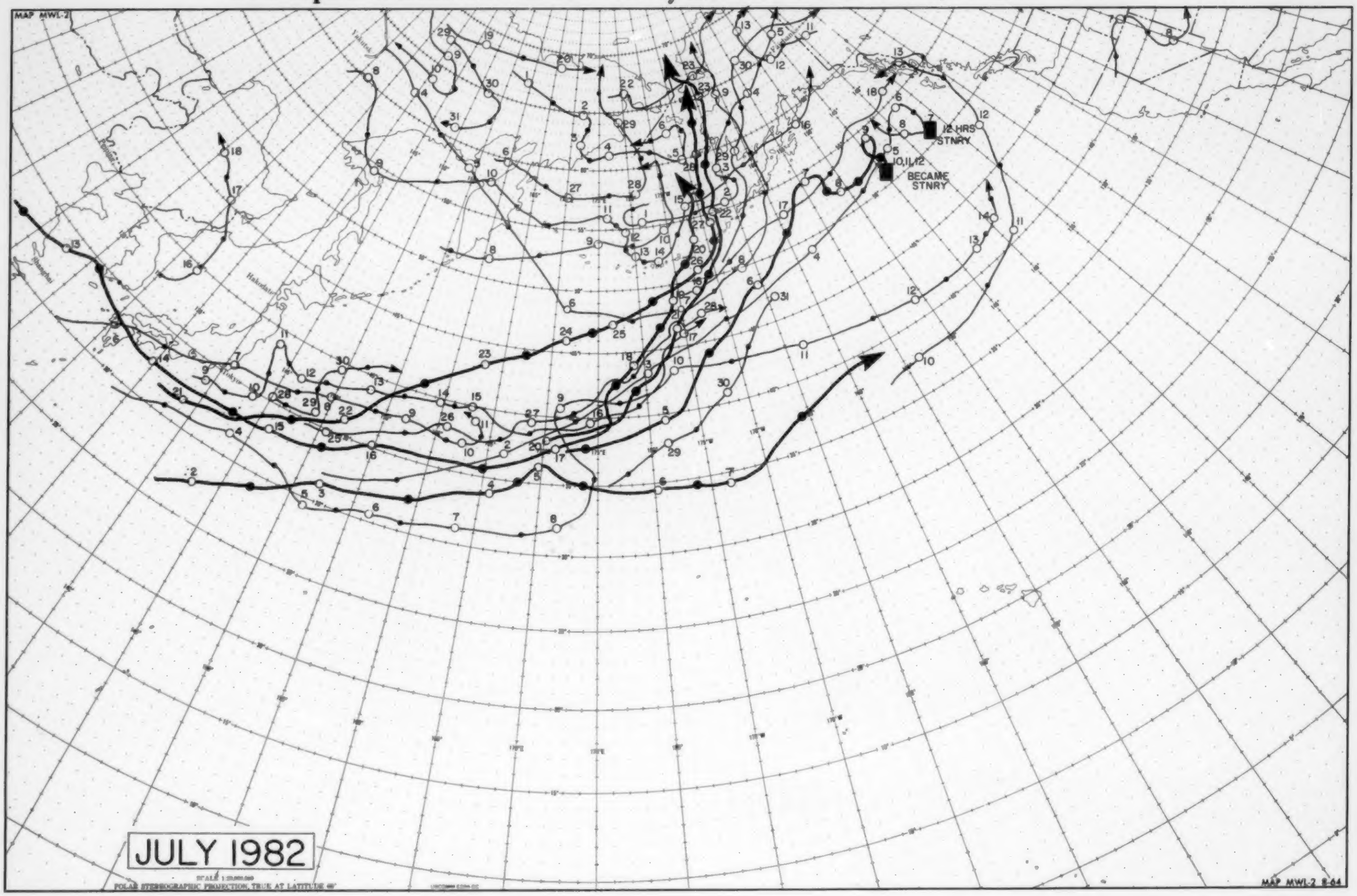
Principal Tracks of Centers of Cyclones at Sea Level, North Atlantic



Closed circle indicates 0000 and open circle 1200 GMT positions. Square indicates stationary center. Cyclone tracks marked with a heavy line are described in the Weather Log.

Principal Tracks of Centers of Cyclones at Sea Level, North Pacific



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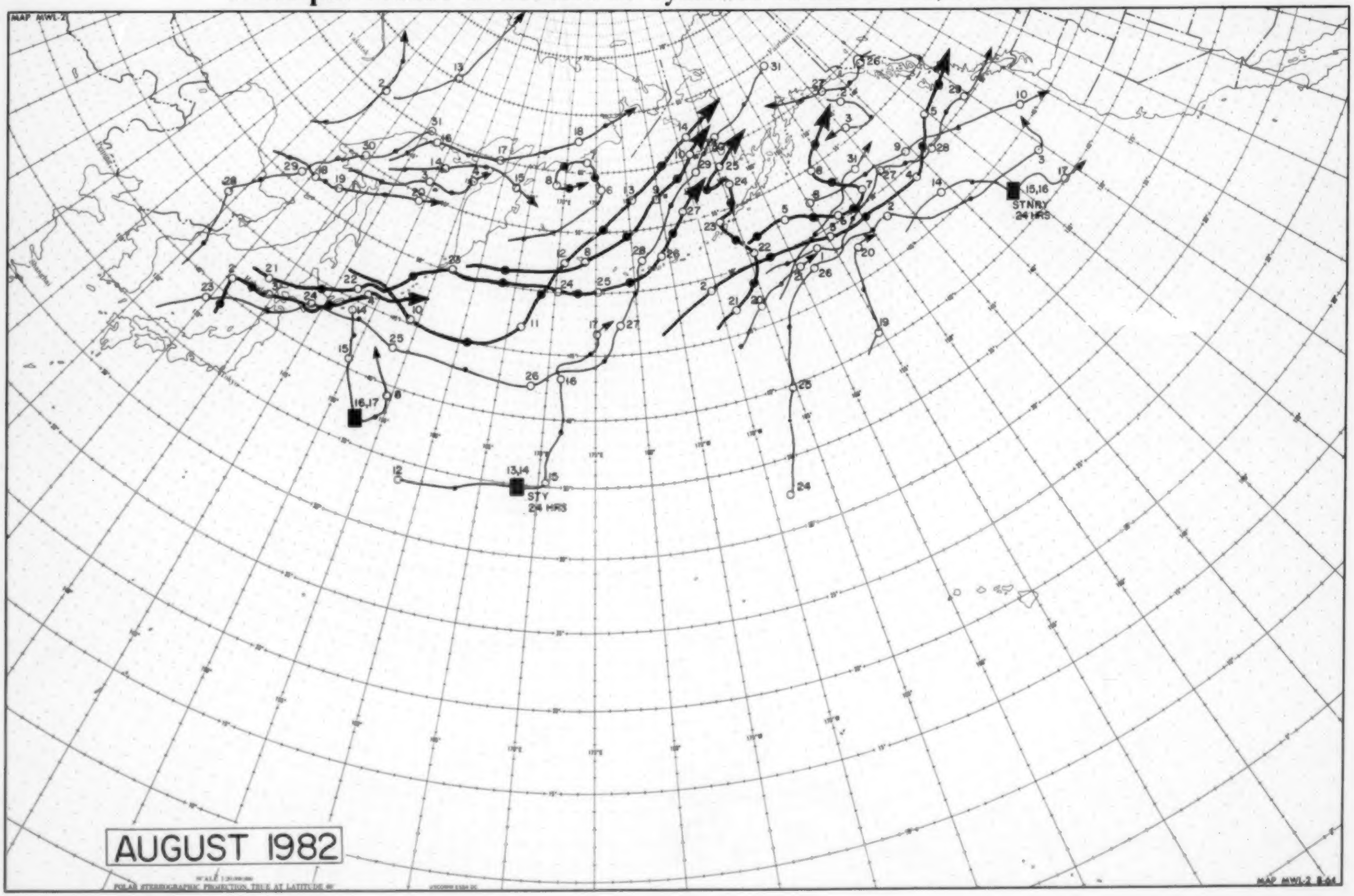
Principal Tracks of Centers of Cyclones at Sea Level, North Pacific



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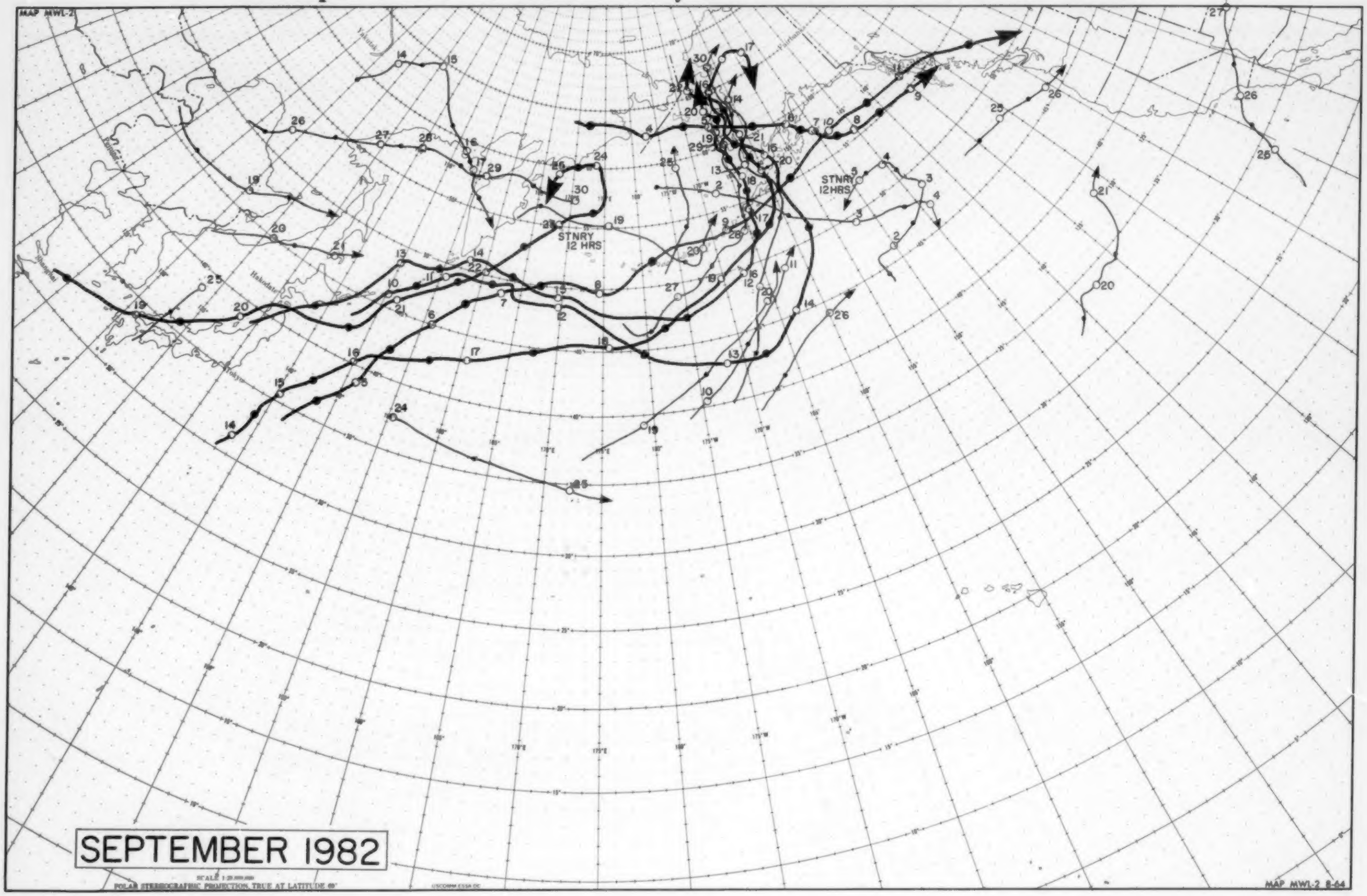
Principal Tracks of Centers of Cyclones at Sea Level, North Pacific



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North Atlantic Selected Gale and Wave Observations

July, August and September 1982

* Nationality	Date	Position of Ship Lat. deg.	Position of Ship Long. deg.	Time GMT	Wind Dir. 10°	Wind Speed kt.	Visibility n. mi.	Present Weather code	Pressure mb.	Temperature °C Air	Temperature °C Sea	Sea Waves† Period sec.	Sea Waves† Height ft.	Swell Waves Dir. 10°	Swell Waves Period sec.*	Swell Waves Height ft.
ATLANTIC	JULY															
PGEF	1	54.6 N	55.5 W	06	13	M 29	2 NM	62	0994.0	3.5	4.0	4	5	13	10	19.5
UTKS	1	28.4 N	44.3 W	06	08	58										
UZHO	1	59.7 N	52.1 W	09	10	M 35	10 NM	02	1011.7	6.0	4.5	3	5			
RIGG	1	47.5 N	48.2 W	09	15	M 43	200 YD	47	1009.9	8.4	5.5	6	10			
WVFN	1	46.8 N	48.7 W	09	16	M 42	.5 NM	61	1010.8	10.2	6.4	6	8			
4XSO	1	33.0 N	23.9 W	12	02	M 39	10 NM	09								
CG2164	1	49.3 N	64.4 W	18	25	M 37	2 NM	55	0991.0	11.0						
KTUG	1	16.5 N	73.0 W	18	10	35	5 NM	02	1017.8	33.4	30.0	6	13			
KUTN	2	37.1 N	57.0 W	00	23	M 30	5 NM	02	1011.2	23.2	23.9	4	10	22	7	19.5
LCJW	2	41.3 N	54.5 W	00	25	M 37	< 50 YD	80	1013.1	20.0	20.0					
FNoL	2	04.6 N	12.6 W	12	02	M 56		02	1017.5		29.0	3	8			
KHAG	2	38.0 N	53.7 W	12	20	M 35	10 NM	03	1020.5	23.3	21.1	6	11.5			
GILT	2	36.1 N	18.9 W	18	02	M 33	10 NM	01	1023.5		19.7	6	10	34	9	21
PDSA	2	36.6 N	07.9 W	18	29	M 37	10 NM	03	1013.9	20.0	19.4	5	10			
VPRB	2	47.3 N	40.2 W	18	26	M 35	2 NM	12	1015.5	15.4	14.0	6	6.5	23	9	6.5
HOGE	3	35.2 N	50.9 W	00	21	40			1017.0	22.0	21.0	5	5	21	7	10
GPUS	3	44.2 N	09.0 W	06	20	M 35	10 NM	25	1012.5	14.2	17.0	6	10	01	8	13
DEJL	3	13.0 N	75.1 W	18	07	30	5 NM		1010.8	27.2	26.0	6	11.5	07	10	19.5
YTLX	3	37.0 N	51.0 W	18	32	M 40	5 NM	21	1018.0	22.4	19.0	9	10	26	12	8
FNZE	4	45.1 N	40.8 W	00	22	M 35	2 NM	10	1015.9	17.8	15.0	4	8			
ELGI	4	45.2 N	36.5 W	12	20	M 37	.25 NM	54	1025.0	20.5	16.0	5	10	29	6	10
EWCS	4	21.7 N	17.4 W	12	01	14	10 NM		1017.0	19.3		22	21			
KHRR	4	38.5 N	65.3 W	12	23	M 50	1 NM	10	1001.2	23.7	23.0	7	18			
PDSA	4	44.0 N	08.8 W	12	07	M 40	10 NM	02	1020.1	18.8		6	10	06	9	13
NOSI	4	36.9 N	01.2 W	18	05	M 40	2 NM		1024.2	24.5	23.3	4	6.5	01	5	8
KTUG	4	16.5 N	73.1 W	18	10	40	5 NM	02	1015.0	32.2	31.0	4	10	09	8	13
S6CC	4	36.5 N	64.5 W	18	22	M 37			1012.0	26.0	25.5	4	8	22	4	6.5
ICDP	5	39.2 N	54.1 W	00	21	M 45	2 NM	34	1011.0	24.0	24.0	5	10	21	7	19.5
KIGR	5	13.2 N	79.2 W	00	08	35	10 NM	02	1011.2	27.2	28.9	4	10	03	4	13
KGJO	5	43.6 N	46.1 W	06	20	25	5 NM	43	1009.4	20.0	19.1	5	10	19	12	19.5
KTUG	5	13.6 N	71.2 W	06	10	45	5 NM	02	1012.0	26.6	31.0	4	10			
WEZH	5	11.9 N	70.6 W	06	07	35	10 NM	02	1012.8	26.7	29.4	9	14.5	07	9	14.5
JFKC	5	28.2 N	49.8 W	12	11	11	10 NM		1025.2	26.0	27.2	5	19.5	08	5	3
VCLW	5	20.8 N	72.9 W	12	10	15	5 NM		1018.1	28.0	30.0	2	1.5	12	20	37.5
FNZE	6	41.1 N	66.2 W	09	25	M 40	10 NM									
KCHO	6	16.0 N	76.4 W	12	12	20	10 NM	01	1014.2	23.9	26.7	4	10	04	7	19.5
DJJB	7	59.1 N	17.7 W	09	23	M 40	10 NM	16	0996.2	11.7	11.5	7	23			
KFCV	7	54.6 N	25.3 W	12	27	M 35	10 NM	01	1010.5	15.0	13.5	9	8	27	10	8
KTUB	7	16.4 N	68.4 W	18	09	40	5 NM	05	1016.0	31.0	30.0	8	13			
DIMW	8	49.6 N	40.2 W	12	01	M 40	5 NM	60	1011.3			5	5	24	6	6.5
WHWU	8	40.0 N	65.8 W	12	19	M 36	10 NM		1020.3	24.0	25.2	4	6.5			
GVHY	9	44.1 N	58.5 W	00	23	M 35	< 50 YD	45	1013.1	12.0	9.0	5	6.5			
WVFN	10	46.8 N	48.7 W	09	22	M 38	50 YD	45	1013.0	1.5	8.5	6	6.5			
ELXN	10	36.2 N	72.2 W	12	06	M 38	5 NM	81	1017.0	24.1	27.8	5	6.5	27	9	8
FNSL	10	46.8 N	10.7 W	12	17	M 54	.5 NM	54	1013.5	16.6	18.1	5	13	18	5	13
KSLJ	10	49.2 N	13.7 W	12	07	M 42	2 NM	80	1011.7	15.0	14.0	5	19.5	07	5	19.5
UUPM	10	20.4 N	17.6 W	12	02	M 56	2 NM	10	1010.6	22.0	19.2	6	6.5			
VTXX	10	47.4 N	14.8 W	18	01	34	2 NM	50	1010.0	15.0	17.0			36	14	19.5
KLJH	10	49.1 N	13.5 W	18	09	35	2 NM	50	1012.0	14.4	16.1	7	5	02	6	6.5
PCUF	11	38.3 N	09.6 W	18	34	M 47	10 NM	02	1018.0	18.7	18.6	6	5	33	9	13.5
WDOP	12	47.8 N	13.4 W	00	34	40	1 NM	58	1019.0	16.7	15.6	5	6.5	34	12	11.5
UYZX	12	45.5 N	41.8 W	12	10	50	5 NM		1030.6	12.0	9.9	3	14.5			
GNMG	13	38.8 N	19.5 W	12	34	M 48	5 NM	02	1025.3	19.5						
PJUT	14	51.7 N	34.7 W	12	03	M 47	10 NM									
FNTO	14	45.4 N	05.5 W	18	29	M 37	2 NM	20	1009.4	17.5	20.0	5	6.5			
KIGR	15	15.1 N	80.4 W	18	09	35	5 NM	02	1012.8	29.4	28.3	4	11.5	09	6	14.5
TFMA	16	50.4 N	43.4 W	00	29	M 37	5 NM	02	1006.3	5.4						
KIGR	16	13.7 N	79.3 W	06	09	35	5 NM	02	1010.8	26.7	27.8	4	11.5	09	4	14.5
JOUL	16	38.1 N	60.0 W	18	02	80		02	1017.5		24.8			15	5	3
CSCG	17	26.0 N	75.6 W	00	21	M 55	10 NM	20	1018.8	28.9						
USTJ	17	59.1 N	34.0 W	00	26	37			1009.1	8.2	8.9	13	18			
UVWZ	17	58.5 N	37.0 W	00	29	29	5 NM		1010.3	8.4	8.4	10	26	29	10	26
FNUV	17	50.4 N	01.1 W	18	27	M 47	10 NM	00	1025.5	20.2	16.8					
OZHO	17	58.8 N	44.4 W	18	27	M 35			1007.6	6.2	4.2	4	8			
VRFZ	17	45.4 N	51.9 W	18	01	43		25	1014.6		10.1					
LGWP	18	34.3 N	72.7 W	00	14	50	> 25 NM									
ULBN	18	21.2 N	17.4 W	06	36	64	10 NM		1015.0	19.5	20.0	10	10			
UZYY	18	21.5 N	74.6 W	06	11	M 37	10 NM	13	1015.8	28.0	28.0					
OXBH	18	59.8 N	35.2 W	12	23	47	5 NM		1009.8	9.0	7.2	7	10			
OZHO	18	58.6 N	36.9 W	12	29	35	10 NM		1009.4	6.2	7.8	5	8			

Nationality	Date	Position of Ship Lat. deg.	Position of Ship Long. deg.	Time GMT	Wind Dir. 10°	Wind Speed kt.	Visibility n. mi.	Present Weather code	Pressure mb.	Temperature °C Air	Temperature °C Sea	Sea Waves† Period sec.	Sea Waves† Height ft.	Swell Waves Dir. 10°	Swell Waves Period sec.*	Swell Waves Height ft.
ATLANTIC	JULY															
YTUW	18	29.9 N	48.1 W	12	21	39	10 NM		1017.0	27.0						
FNPH	18	45.3 N	13.9 W	18	03	16	10 NM			17.2	16.6	10	21	09	5	5
PFMS	18	49.5 N	10.1 W	18	05	37	5 NM		1020.3	18.5	18.5	5	6.5	09	5	6.5
VCLM	18	58.7 N	06.0 W	18	22	M 40	5 NM	02	1027.0	13.0						
OXBH	19	50.6 N	45.1 W	12	19	M 35	5 NM	61	1009.0	8.2	5.3	7	8			
GVHY	19	44.1 N	58.5 W	18	20	M 35										
VCLM	19	50.8 N	17.2 W	18	22	M 40	5 NM	02	1027.0	12.0						
GVHY	20	44.1 N	58.5 W	09	21	M 35	< 50 YD	45	1014.9	16.7	12.2	4	5			
D8GC	20	48.1 N	26.4 W	12	12	M 35	10 NM	02	1022.1	17.6	15.8	3	5	12	5	8
GYFQ	20	14.2 N	69.0 W	18	01	M 60	10 NM	03	1014.0	22.0	28.9					
JPLN	21	47.7 N	30.6 W	12	10	M 37			1014.3	16.5	16.0	5	8	11	8	11.5
VDND	22	44.2 N	67.7 W	00	03	M 35	5 NM		1009.0	13.5	11.7					
UUXO	22	31.3 N	68.0 W	06	25	78	10 NM		1019.0	29.4						
LBGH	22	36.2 N	69.6 W	18	27	43	> 25 NM		1017.0	26.0	26.0	4	5			
UEAR	22	01.7 N	25.8 W	18	03	39		02	1013.4			3	8			
USNG	23	26.2 N	18.0 W	06	04	39			1018.0	22.2	22.0	5	6.5			
SLIY	23	45.5 N	40.2 W	12	14	M 45	10 NM	03	1022.8	18.0	16.0			09	8	5
PFMS	23	25.5 N	16.0 W	12	04	50	2 NM		1015.0	22.5	23.4	6	8	02	7	10
VSSS	23	51.5 N	55.2 W	12	22	M 39	50 YD		1011.8	11.0						
XCML	23	33.0 N	23.2 W	12	07	M 08	5 NM	03		23.2	23.0	2	6.5	01	0	47.5
ZCUV	24	36.4 N	66.1 W	00	25	M 36	10 NM	21	1019.0	22.0						
FNZX	24	43.6 N	19.0 W	06	14	M 37			1019.2	18.2	17.5	4	8	21	6	8
UGVJ	24	21.1 N	17.6 W	06	08	78	10 NM	02	1015.0	21.2	21.3			04	7	5
YTTW	24	27.9 N	65.5 W	06	26	02	5 NM	02	1021.6	31.0	23.0	2	1.5	15	0	50.5
OVOM	24	59.5 N	21.2 W	12	24	M 35	10 NM		1018.0	13.0						
FNUV	24	50.0 N	61.5 W	18	27	M 39	10 NM	00	1009.5	15.7	11.0	4	6.5	00	0	0
FNFD	25	44.1 N	08.2 W	06	06	M 47	5 NM	02	1025.4	18.8		4	3			
SLIY	25	49.1 N	22.2 W	18	09	M 16	2 NM	05	1026.4	18.6	17.5	12	19.5	14	14	16.5
CG2835	25	47.2 N	56.5 W	18	01	M 47			1016.5		14.0					
OVOM	25	59.7 N	32.3 W	18	20	M 35	.5 NM		1014.5	11.0						
UTNE	26	21.0 N	63.2 W	00	08	16	10 NM	02	1015.9	28.0	29.0	3	19.5			
GYHA	26	31.2 N	18.1 W	06	36	M 60	5 NM									
OVOM	26	59.3 N	36.3 W	06	25	M 47	5 NM		1017.0	8.5						
TSLR	26	43.9 N	08.8 W	06	07	M 48	2 NM	05	1023.0	19.0	18.0	5	10			
UWDP	26	30.9 N	60.0 W	06	18	39	10 NM		1025.6	26.0		2	1.5			
ZSGT	26	01.1 N	17.5 W	18	11	08	10 NM		1014.4	22.6	23.4	2	1.5	13	6	21
SLIK	27	26.1 N	93.4 W	00	12	05	10 NM	02	1018.8	30.0	32.2	8	3	16	6	29.5
FANC	27	57.0 N	13.0 W	06	01	55		02	1026.6		15.0			22	9	3
NANTUC	27	40.5 N	69.5 W	15	19	M 47		00	1010.2	10.0						
UICP	27	47.8 N	21.1 W	18	10	M 39	2 NM									
4ZJF	27	22.1 N	73.3 W	18	11	20	10 NM	02	1017.4	30.6	28.3	3	10	06	5	19.5
UIHW	28	22.7 N	50.9 W	00	09	39	10 NM									
GLUA	28	51.2 N	02.1 W	06	04	M 35	5 NM	01	1018.8	16.3	16.6	6	13	03	9	16.5
UNUC	29	36.7 N	12.0 W	06	36	12	10 NM		1015.1			22	23			
UEBS	29	35.7 N	70.3 W	12	23	M 37	50 YD	81	1017.5	25.9						
SGDH	29	58.0 N	38.1 W	12	28	M 60	5 NM	02	1011.5	9.0						
FNYD	29	42.0 N	09.8 W	15	35	40	5 NM		1013.0	19.5	19.1	6	8			
GVHY	29	44.1 N	58.5 W	15	15	M 38	.25 NM	80	1009.0	18.0	15.1	4	6.5			
VYSP	29	46.6 N	61.8 W	15	14	M 42	2 NM	64		18.0						
VCSZ	29	45.2 N	59.4 W	18	18	M 35	200 YD	45	1013.8	17.0						
VPFZ	29	42.9 N	47.5 W	18	01	60		02	1025.2		16.7			31	5	10
C6BP	30	45.7 N	60.1 W	00	23	M 37	2 NM	07	1004.0	15.0						
VGDD	30	46.7 N	55.9 W	00	18	M 37	1 NM		1004.0							
VYSM	30	46.8 N	61.8 W	03	26	M 43	10 NM	03	0999.2	17.0						
RIGG	30	47.5 N	48.2 W	09	13	M 42	2 NM	60	1012.5	12.0	10.8	6	6.5			
KMJM	30	12.7 N	78.1 W	12	05	35	5 NM	02	1013.2	27.5	27.2	4	6.5	09	6	10
VOCB	30	47.9 N	61.0 W	12	29	M 35	5 NM	02	1002.8	13.0						
PJKR	30	19.4 N	80.7 W	18	11	M 37	5 NM		1018.0		28.2	4	16.5	13	8	11.5
WVFN	31	48.2 N	50.4 W	00	20	35	5 NM		1005.0	11.7	11.1	5	8			
YSHD	31	49.1 N	40.1 W	06	19	M 37	2 NM			17.6						
DZNP	31	46.9 N	44.9 W	12	25	M 58										
KPJM	31	17.9 N	75.2 W	12	09	35	5 NM	01	1017.8	28.0	28.2	5	8	09	7	11.5
DOFN	31	30.0 N	44.9 W	18			10 NM	32	1024.2	27.4	27.5			12	5	19.5
GR. LAKES	JULY															
VOPL	1	41.9 N	82.0 W	12	33	M 41	> 25 NM	02		15.0	2.7					

Nationality	Date	Position of Ship Lat. deg.	Position of Ship Long. deg.	Time GMT	Wind Dir. 10°	Wind Speed kt.	Visibility n. mi.	Present Weather code	Pressure mb.	Temperature °C. Air	Temperature °C. Sea	Sea Waves† Period sec.	Sea Waves† Height ft.	Swell Waves Dir. 10°	Swell Waves Period sec.*	Swell Waves Height ft.
ATLANTIC	AUG.															
DZUT	1	17.1 N	79.4 W	00	07	M 25	.5 NM		1018.5	28.0	31.0	10	19.5	07	10	19.5
EOEM	1	21.7 N	17.3 W	00	02	43	5 NM	10	1016.3	21.0	22.0	7	8	00	0	0
UIIL	1	08.8 N	14.8 W	06	01	74	10 NM									
WCJS	1	39.2 N	55.1 W	12	21	M 35	5 NM	81	1006.0	26.1	23.3	5	10	21	6	13
VWXL	1	37.5 N	54.6 W	18	22	M 35	1 NM			25.5						
KMJM	2	32.2 N	73.8 W	18	23	35	2 NM	81	1017.5	25.5	28.8	4	6.5	25	3	5
VYQJ	2	53.4 N	55.5 W	18	33	40	10 NM		0995.0	11.0						
CGDK	3	44.1 N	63.3 W	06	13	M 40	< 50 YD	45	1014.0	15.0						
CG2835	3	48.4 N	59.3 W	18	01	39			1039.0		14.2					
HPAU	3	12.7 N	70.0 W	18	08	M 19	10 NM	00	1013.5	29.0		8	8	08	0	54
OZHQ	4	60.0 N	36.8 W	12	23	M 35	5 NM	02	1011.2	8.8	7.6	5	8			
WJBJ	4	49.2 N	14.9 W	18	30	30	5 NM	02	1019.1	18.3	15.6	5	14.5	30	5	19.5
FNPR	5	33.6 N	14.1 W	00	02	M 56	10 NM	02	1019.5	21.0	24.0					
UTWR	5	13.7 N	59.3 W	00	07	21	10 NM		1014.1	27.8		22	21			
FNTH	5	49.7 N	13.3 W	06	32	50	5 NM		1022.2	17.9	16.7	4	6.5	32	8	10
GODT	5	55.5 N	01.5 W	06	33	M 03	200 YD	43	1014.0	15.2	14.0	1	1.5	10	6	23
SLPN	5	49.1 N	13.1 W	06	35	M 35			1020.8	16.0	17.5	5	10	34	7	10
KIBK	5	40.1 N	55.7 W	18	21	50	5 NM	25	1015.3	25.5	23.3	7	16.5			
UPAR	5	49.4 N	09.8 W	18	13	M 35	2 NM	12	1017.1	18.4	19.0	8	5	30	18	26
WDDP	5	41.4 N	31.9 W	18	12	M 43			1038.0	27.8						
FNGM	6	50.1 N	10.5 W	09	31	M 35	5 NM	03	1021.0	17.2	17.8	5	6.5	00	0	0
FNYD	6	40.1 N	09.9 W	15	36	M 35	5 NM	05	1018.0	21.4	18.3	4	8	35	12	13
GTHZ	6	40.1 N	09.7 W	18	34	38	5 NM		1017.2	20.0	18.0	5	14.5	34	5	18
HRUB	6	41.2 N	08.8 W	18	35	M 25	5 NM	10	1014.0	17.0		4	10	34	6	21
CVOK	6	59.1 N	36.2 W	18	27	M 58	.25 NM	45	0999.0	7.5						
UWOI	6	40.0 N	11.0 W	18	36	35	2 NM		1021.4	22.0	21.0	8	11.5			
PGQM	7	06.4 N	12.3 W	00	02	M 40	10 NM	02	1014.5							
AMRK	7	49.3 N	30.6 W	11	23	M 29	1 NM	11	1011.5	18.4	16.0	10	18	24	12	19.5
DJLJ	7	36.2 N	32.4 W	12	01	M 70	10 NM	02	1026.0	24.5	24.0					
ESSR	7	60.0 N	35.2 W	12	23	M 29	2 NM	50	0998.2	8.2	8.2	8	23			
OVGK	7	59.2 N	28.7 W	12	25	M 47	10 NM	02	1009.0	10.0						
ABCM	7	48.7 N	25.4 W	18	23	M 38	2 NM		1021.5	20.0	18.0	6	10	23	6	13
CSLJ	7	47.1 N	23.8 W	18	22	M 15	5 NM	02				3	5	24	6	23
GUWM	7	40.1 N	11.4 W	18	02	35	10 NM		1020.6	19.5		5	10	02	5	13
UIWQ	7	41.5 N	09.3 W	18	01	45	10 NM		1019.5	18.2	20.0	10	10	35	15	16.5
SPVA	8	45.1 N	39.7 W	00	05	M 35	5 NM		1016.8	19.0	16.0					
ABCM	8	48.3 N	28.5 W	06	23	M 42			1020.0	18.0	17.0	6	10	22	6	13
CGCL	8	44.4 N	59.9 W	06	01	50		00			16.0					
FNNX	8	34.9 N	13.9 W	06	04	25	10 NM		1018.5	20.3	21.2	11	23			
FNYG	8	19.2 N	17.8 W	06	29	14	10 NM	01	1012.4	23.0	25.8	2	3	34	8	24.5
GTOT	8	58.4 N	09.4 W	12	28	M 35	10 NM	25	1006.4	13.7	14.7	8	14.5	26	10	13
VPKC	8	43.8 N	57.4 W	12	01	M 48			1018.1							
D5IC	8	59.1 N	62.2 W	18	02	46	> 25 NM		1013.8	11.2	5.6			36	6	1.5
GTOT	9	57.3 N	09.3 W	00	23	M 27	10 NM	03	1014.8	14.9	15.1	6	10	25	8	19.5
UGSW	9	28.9 N	57.8 W	00	18	17	10 NM	02	1023.6	28.0		22	23			
ULBZ	9	22.5 N	17.1 W	00	36	M 43	10 NM	02	1014.7	22.0						
GRPZ	9	35.6 N	06.4 W	12	06	M 36	10 NM	05	1010.3	24.4	23.0	4	19.5	05	6	5
ABCM	9	45.7 N	39.1 W	18	09	M 36	10 NM	02	1023.0	22.0	18.0	4	6.5	09	14	8
D5HQ	9	42.4 N	09.9 W	18	01	M 35	5 NM	02	1020.0	18.0						
GPIU	9	59.1 N	10.6 W	18	27	M 35	10 NM	28	1005.4	12.3	14.2	7	11.5	26	10	19.5
OVOK	9	59.5 N	05.7 W	18	22	M 47	10 NM	15	1007.5	14.0						
ESSR	10	59.3 N	35.9 W	00	27	M 33	5 NM	02	1010.7	8.5	7.8	10	24.5			
OVOK	10	59.5 N	03.1 W	00	22	M 35	> 25 NM	15	1007.5	12.5						
4XSO	10	36.0 N	06.5 W	06	09	35	5 NM			21.6	22.2	5	8			
GOMM	10	58.8 N	05.3 W	06	26	M 42	10 NM	07	1007.3	13.1	14.0	7	10	27	10	13
FNNX	10	43.4 N	09.5 W	09	05	35	10 NM		1020.5	18.5	17.3	5	10			
UMBT	10	51.7 N	24.2 W	12	11	M 37	2 NM	62	1002.9	15.6	15.6	4	16.5			
UYIG	10	51.2 N	28.8 W	12	03	35	5 NM	01	1011.7	14.0	14.0	7	8			
VCDT	10	48.6 N	63.0 W	15	15	M 40	1 NM			15.0						
ABCM	10	43.5 N	45.8 W	18	02	M 36	10 NM	01	1026.0	25.0	22.0	4	6.5	02	14	6.5
CGYM	10	46.8 N	59.6 W	18	12	M 37	2 NM	06	1018.0	16.0						
CGCM	11	44.9 N	62.2 W	00	01	M 80	50 YD	41	1015.6		17.0					
DNOB	11	16.1 N	78.4 W	00	07	M 13	5 NM	03	1013.6	27.0	28.1	4	5	08	7	24.5
PFWI	11	52.5 N	26.4 W	00	35	M 37	5 NM	02	1006.5	13.0	15.8	11	14.5			
UMQT	11	51.1 N	21.9 W	00	20	M 37	5 NM	02	0990.9	15.0	15.0	6	19.5			
UYIG	11	50.4 N	32.0 W	00	30	43	10 NM	02	1017.5	14.7	14.2	6	6.5			
VCQN	11	43.6 N	68.7 W	00	01	67		05	1013.6		17.0					
CGCL	11	44.5 N	60.7 W	06	19	M 75	50 YD	45	1015.4	20.0	18.0					
GWEL	11	50.2 N	21.6 W	06	28	M 20	5 NM	25	1009.8	14.3	13.8	5	5	28	8	19.5
KFGJ	11	50.5 N	22.5 W	06	28	40	5 NM	02	1010.0	14.0	17.0	3	6.5	28	5	13
FNNK	11	35.9 N	05.6 W	09	08	M 37	2 NM	05	1017.6	21.8	21.0	3	5	08	3	5
GOOB	11	52.3 N	16.1 W	12	26	45	10 NM		1005.4	16.5	13.0	2	16.5	27	5	16.5
KLJM	11	49.9 N	23.5 W	12	30	40	10 NM	03	1017.0	14.4	16.7	5	8	30	9	16.5
OLBB	11	55.1 N	18.2 W	18	29	M 44	5 NM	15	1001.6	13.2	15.0	14	16.5			
UFBE	11	52.4 N	22.5 W	18	26	48	2 NM		1011.2	15.5	13.5	7	8			
ABCM	11	41.7 N	52.8 W	21	24	M 35	10 NM	01	1025.0	25.0	21.0	4	5	24	14	5
UFPS	12	58.7 N	05.1 W	00	22	M 39				14.0	12.0	10	14.5			
ABCM	12	41.7 N	54.6 W	03	22	M 35	10 NM	01	1025.0	25.0	23.0	XX	5	06	XX	5
PHQZ	12	58.7 N	00.6 W	03	18	M 58	10 NM		0998.5	14.0						
4XIE	12	31.1 N	80.4 W	18	20	M 50	10 NM	01	1010.0	30.4						

Nationality	Date	Position of Ship Lat. deg.	Position of Ship Long. deg.	Time GMT	Wind Dir. 10°	Wind Speed kt.	Visibility n. mi.	Present Weather code	Pressure mb.	Temperature °C. Air	Temperature °C. Sea	Sea Waves† Period sec.	Sea Waves† Height ft.	Swell Waves Dir. 10°	Swell Waves Period sec.*	Swell Waves Height ft.
ATLANTIC	AUG.															
ELBL	12	48.2 N	22.0 W	18	25	M 28	2 NM	21	1017.0	16.8	16.0	6	14.5	28	11	19.5
GPAJ	12	49.5 N	16.3 W	18	26	M 37	10 NM	15	1014.9	18.3	17.0	4	6.5	28	11	16.5
UOIW	12	57.8 N	13.1 W	18	35	25	10 NM	01	1002.0	14.0	18.0	11	19.5			
FNTO	13	50.0 N	02.6 W	06	23	M 45	5 NM	20	1012.8	16.3	18.0	5	5			
TSLR	13	49.8 N	03.2 W	06	01	71		02	1014.8		16.0	4	8	24	6	13
GTOT	13	57.3 N	09.3 W	12	27	M 18	10 NM	03	1005.1	12.8	14.0	6	6.5	34	10	26
UJRO	13	47.2 N	11.6 W	12	31	M 47	5 NM	03	1019.4	18.0	17.0	5	5			
TFKD	13	60.0 N	39.8 W	15	24	37	5 NM		0992.1	7.2						
UTJY	13	58.7 N	35.4 W	18	21	35	10 NM		0995.9	8.5	8.5	11	14.5			
YCUC	14	38.8 N	62.9 W	00	20	M 27	10 NM	03	1017.0	26.0	24.0	8	19.5	20	8	19.5
GTOT	14	58.7 N	07.0 W	06	25	M 12	10 NM	15	1006.1	12.2	12.9	2	3	35	10	19.5
TFKD	14	60.0 N	41.7 W	06	26	37	> 25 NM		0984.5	4.2						
ESFG	14	58.3 N	36.6 W	12	26	35	10 NM	02	0990.9	15.0	11.0	9	11.5			
SHJA	14	52.5 N	36.0 W	12	30	M 45	5 NM	02	1011.0	12.5						
ESVJ	14	58.4 N	36.5 W	18	26	35	10 NM			12.5	9.0	11	14.5			
EVRV	14	58.5 N	36.5 W	18	26	37	10 NM		0988.9	9.4	9.0	10	16.5			
OYOR	14	59.0 N	43.5 W	18	30	37	10 NM		0996.4	5.3	3.9	7	16.5			
UFDS	14	58.8 N	36.1 W	18	25	35	5 NM		0989.3	8.3						
USFG	14	58.9 N	36.9 W	18	27	37	5 NM	02	0989.3	9.0	11.0	9	26			
USYF	14	58.5 N	36.1 W	18	26	35	5 NM		0989.9	6.0						
UTJY	14	58.2 N	36.4 W	18	27	39	10 NM		0990.5	8.5	8.3	12	16.5			
UYZX	14	56.9 N	36.2 W	18	25	47	> 25 NM	01	0996.6	7.7	10.1	5	10			
SHJA	15	51.5 N	39.6 W	00	23	M 47	5 NM	02	1013.0	14.5						
ESSR	15	55.2 N	37.6 W	06	29	M 31	5 NM	02	1006.5	8.0	9.0	10	23			
UYZX	15	55.5 N	37.7 W	06	26	43	5 NM	02	1006.2	6.6	10.2	5	6.5			
CYCM	15	43.2 N	65.5 W	12	01	M 35	5 NM		1016.1							
GTOT	15	56.3 N	08.0 W	18	19	M 26	10 NM	02	0999.2	14.6	14.2	4	10	23	10	19.5
CTL	16	56.8 N	20.7 W	03	26	M 40	5 NM	25	0986.2	10.4	14.2	7	11.5	22	11	18
EMXB	16	23.6 N	17.5 W	06	01	35			1015.5	21.0	20.0	4	11.5			
ESHX	16	21.6 N	17.8 W	12	02	35	10 NM	02	1016.8	22.0	23.0	6	10			
FNRS	16	26.9 N	49.8 W	12	02	68										
JMLC	16	55.6 N	26.6 W	12	27	M 35	5 NM	25	1009.5	13.0	13.0	4	11.5	28	10	14.5
KIBJ	16	36.7 N	10.4 W	18	36	36	> 25 NM	00	1020.0	21.1	19.4	6	10	36	6	10
OLCC	17	51.5 N	13.8 W	06	01	M 38										
SPYM	17	50.9 N	10.3 W	06	27	M 39	10 NM	02	1010.6	16.0						
DZCW	17	49.7 N	19.3 W	12	23	35	2 NM	18	1008.0	18.5	17.5	6	10	23	6	13
GXOB	17	47.1 N	08.2 W	12	25	15	> 25 NM		1019.5	19.5	18.0	3	6.5	34	9	23
OKOK	17	59.4 N	00.0 W	12	20	M 62	> 25 NM	02	0999.5	15.4						
NANTUC	17	40.5 N	69.5 W	15	26	M 47		31	1010.2	33.0						
ELOQ	17	49.8 N	19.2 W	18	24	M 40	1 NM	61	1005.0		16.0	6	8	23	9	13
FNTH	17	50.2 N	12.6 W	18	23	M 35	1 NM	10	1007.6	17.2	16.6	3	5	24	8	18
S6CD	17	57.7 N	19.4 W	18	30	M 16	2 NM	60	0994.5	12.0	14.0	5	16.5	31	10	24.5
ZCKE	17	50.4 N	08.8 W	18	24	M 31	5 NM	60	1007.8	18.7	19.1	8	13	26	10	19.5
GUPM	18	50.4 N	00.7 W	00	24	M 36	10 NM	07	1012.0	16.9		7	10	24	8	6.5
C7R	18	46.4 N	15.7 W	03	25	29	5 NM		1015.2	18.7	18.3	9	19.5	30	12	6.5
FNNX	18	50.2 N	07.4 W	03	33	40	2 NM		1005.0	17.9	17.4					
GRSA	18	50.1 N	10.2 W	06	29	M 17	10 NM	01	1009.0	15.2	18.1	4	10	26	8	24.5
GOYE	18	47.0 N	06.7 W	06	25	M 52	2 NM	62	1012.8	18.0	18.0	6	16.5	26	4	5
LFHO	18	44.7 N	58.4 W	06	21	40			1013.2	18.6	17.5	7	10			
ZCKE	18	51.2 N	12.6 W	06	32	M 25	10 NM	81	1008.0	15.0	16.0	7	11.5	28	10	19.5
DZCW	18	49.1 N	25.9 W	09	31	10	> 25 NM	03	1018.5	15.5	16.0	2	3	31	10	57
DAKE	18	55.5 N	23.5 W	12	28	M 37	10 NM	25	1010.0	11.1	12.7	6	10	31	9	18
S6CD	18	56.4 N	24.2 W	12	28	M 25	5 NM	64	1008.3	10.1	13.0	6	16.5	29	9	29.5
WIAG	18	28.8 N	69.6 W	12	32	20	10 NM	02	1017.9	27.8	25.0	2	1.5	23	10	24.5
FNEM	18	43.6 N	46.3 W	18	01	64										
VCLM	18	58.7 N	20.2 W	18	29	M 42	10 NM	15	1001.0	11.0						
CTL	19	57.4 N	20.9 W	00	29	M 35	5 NM	02	1006.8	11.3	12.9	6	10	28	10	14.5
DZCW	19	48.2 N	31.9 W	00	04	12	10 NM	01	1025.0	17.0	16.0	2	5	36	10	57
ZCKE	19	52.5 N	20.3 W	00	29	M 24	10 NM	02	1016.8	13.6	18.1	5	10	32	11	21
ESRF	19	57.2 N	19.7 W	12	29	35	10 NM		1009.3	12.5	19.0	7	5	31	8	8
FNZX	19	31.3 N	70.2 W	12	19	M 39	> 25 NM	02	1022.5	28.4	28.4	4	5			
PFMV	19	14.2 N	75.1 W	12	08	24	5 NM			27.8		4	10	08	8	19.5
GRHP	19	15.1 N	73.7 W	18	07	M 35	5 NM	07	1011.7	28.3	27.5	7	18	07	8	16.5
ZCSQ	19	46.4 N	46.3 W	18	19	M 37	50 YD		1012.0	16.0						
NPFJ	19	48.7 N	43.1 W	22	16	M 37	.5 NM			18.6	17.8	4	5			
GONS	20	30.0 N	60.2 W	00	00	00	10 NM	16	1027.3	28.0	28.7	0	0	12	0	49
TFXN	20	59.2 N	05.2 W	00	31	M 64	5 NM	21	0994.2	11.0						
GJVE	20	58.6 N	06.7 W	06	30	M 45	2 NM	54	0994.8	11.2	13.3	5	14.5	30	10	16.5
GPIU	20	57.0 N	08.2 W	12	32	M 35	5 NM	02	1005.6	13.3	13.6	8	13	32	7	16.5
ONBI	20	49.4 N	38.7 W	12	31	M 37	5 NM	01	1011.5	14.3	13.0	4	6.5	31	8	10
PEOB	20	40.6 N	09.6 W	12	36	47	10 NM		1017.9	19.0	20.2	3	5	34	8	6.5
S6CN	20	51.2 N	37.5 W	12	28	M 16	5 NM		1005.2	13.0	14.0	5	13	26	9	23
WCUU	20	33.4 N	50.8 W	12	02	M 51	10 NM	02	1027.8		27.0			31	5	5
ENVK	20	14.5 N	71.8 W	18	07	41	10 NM		1013.6	29.0	29.0	5	8			
EWAK	20	53.0 N	34.2 W	18	27	43	5 NM	02	1013.7	11.5	12.0	9	11.5			
FNFD	20	43.9 N	08.5 W	18	05	M 37	10 NM	02	1021.5	19.0		6	3	34	8	6.5
6POF	20	56.7 N	07.3 W	18	30	M 35	5 NM	02	1007.3	13.0						
H8DE	20	14.4 N	77.6 W	18	07	M 35	5 NM	92	1013.5	30.0	29.0	6	13	09	9	11.5
OZHQ	20	59.5 N	41.5 W	18	36	M 35	10 NM	02	1003.7	8.7	6.8	6	10			
UWGP	20	56.1 N	15.4 W	18	32	35	10 NM	02	1001.1	16.2	14.0	8	10			
PBQE	21	37.2 N	16.5 W	00	03	40	10 NM		1016.0	21.0						

Nationality	Date	Position of Ship Lat. deg.	Position of Ship Long. deg.	Time GMT	Wind Dir. 10°	Wind Speed kt.	Visibility n. mi.	Present Weather code	Pressure mb.	Temperature °C Air	Temperature °C Sea	Sea Waves Period sec.	Sea Waves Height ft.	Swell Waves Dir. 10°	Swell Waves Period sec.	Swell Waves Height ft.
ATLANTIC	AUG.															
FNNX	21	53.4 N	29.5 W	06	26	M 40			1010.0	12.7	11.5					
KCBE	21	14.1 N	78.7 W	06	08	35	5 NM	01	1015.2	28.0	30.6	3	8	08	6	13
FNAW	21	27.6 N	18.7 W	09	04	46	10 NM		1016.7	23.5	22.0	5	.3			
9VKR	21	37.4 N	61.1 W	12	22	M 37	2 NM	65	1013.0	24.5	28.0	7	14.5	22	0	10
DEIR	21	21.0 N	75.4 W	12	02	M 80	10 NM	02	1017.9		28.6					
GOWS	21	59.2 N	00.4 W	12	31	M 35	5 NM	20	1003.8	11.8						
UNAO	21	36.6 N	65.0 W	12	15	M 18	1 NM	52	1012.5	23.9	26.2	6	24.5		8	
PJAE	21	35.4 N	67.7 W	12	27	41	2 NM	95	1014.8	24.8						
KIBJ	21	40.1 N	53.8 W	18	22	35	5 NM		1012.8	23.3	25.0	5	8	22	7	10
OZHQ	21	59.5 N	31.6 W	18	28	M 35	10 NM	02		10.6	8.5	6	10			
KMLV	22	20.4 N	72.1 W	00	06	M 62										
EWAK	22	50.0 N	41.5 W	06	21	48	10 NM		1006.5	16.3	12.5					
OZHQ	22	59.5 N	24.0 W	12	27	M 35	5 NM	51	1011.6	11.8	12.0	5	8			
PGEF	22	56.0 N	58.2 W	12	29	M 40	1 NM	10	0994.5	4.0	4.6	3	6.5	31	10	11.5
UURX	22	12.3 N	74.0 W	18	07	39	10 NM		1010.3	29.5	28.0	8	11.5			
FNZX	23	35.1 N	58.2 W	00	21	M 35	10 NM	01	1020.2	26.2	27.0	5	6.5			
UURX	23	13.3 N	71.6 W	06	07	35	10 NM		1011.7	26.0	27.0	7	10			
HPFG	23	23.2 N	72.8 W	12	11	20	10 NM	11	1020.0	27.0	26.0	8	19.5	11	7	16.5
VGFQ	23	56.8 N	55.3 W	12	29	36	5 NM	02	0999.0	6.0						
ENXM	23	26.0 N	15.6 W	18	02	58	10 NM		1024.6		25.0					
OZHQ	23	59.4 N	11.5 W	18	18	35	5 NM		1010.1	13.0	12.8	4	6.5			
C7L	24	56.8 N	19.3 W	03	33	M 37	5 NM	25	1000.2	11.5	13.1	8	11.5	28	10	6.5
SPTO	24	41.0 N	09.6 W	06	35	35	10 NM	02	1015.3	17.5	18.0	7	10			
GUDS	24	57.0 N	14.0 W	12	30	M 40			1001.8	13.2	14.3	6	11.5			
GYAR	24	50.4 N	06.5 W	12	24	M 37	2 NM	61	1015.1	17.5	17.2	4	6.5	26	6	11.5
KGMK	24	38.2 N	38.2 W	12	11	M 05	> 25 NM	02	1030.8	25.6	25.6	5	1.5	01	22	31
UYSN	24	34.8 N	18.2 W	12	01	70	5 NM		1023.2	22.5	24.0	6	6.5			
DHES	24	55.4 N	11.7 W	15	27	M 41	5 NM	20	1005.6	14.1	14.0	6	11.5	27	6	13
GJVE	24	57.6 N	08.7 W	18	31	M 45	5 NM	81	0991.5	12.8	13.4	6	16.5	30	10	26
GLNE	24	52.0 N	31.5 W	18	26	M 62	10 NM	02	1021.3	14.2	14.2	5	11.5	26	7	10
GUMF	24	57.3 N	07.2 W	18	29	M 45	5 NM	81	0996.4	13.7	11.8					
GYFE	24	58.0 N	05.9 W	18	25	M 40	2 NM		0991.8	13.0	12.8	5	8	26	7	10
KIGR	24	13.3 N	79.6 W	18	09	35	10 NM	02	1014.0	29.4	31.1	4	6.5	09	5	10
OZHQ	24	58.6 N	02.0 W	18	16	M 35	1 NM	63	0989.9	12.6	12.4	6	10			
EOBX	25	57.9 N	05.2 W	00	25	39	5 NM		0993.0	11.4	13.0	7	5			
UJGC	25	54.1 N	10.6 W	00	28	35	10 NM		1009.4	14.5	15.2	8	11.5			
EOEX	25	57.9 N	05.2 W	06	25	35	5 NM		0993.7	11.6	13.0	6	5			
ESVL	25	34.2 N	13.4 W	06	02	58	5 NM	10	1019.8	22.0	19.0	6	6.5			
NVAI	25	27.4 N	91.4 W	06	18	61	10 NM		1020.1	28.3		2	1.5			
PBVG	25	50.7 N	02.1 W	06	27	M 43				13.3						
DJTR	25	58.4 N	01.4 W	09	24	M 40	5 NM	01	0993.3	12.0	11.7	7	13			
WVFN	25	48.2 N	50.4 W	12	13	M 41	1 NM	76	1015.4	14.2	14.0	6	6.5			
DBFP	25	56.4 N	14.3 W	15	25	M 25	5 NM	15		12.6	13.4	4	3	26	14	19.5
DHES	25	54.5 N	23.2 W	15	28	M 44	5 NM	21	1005.1	10.6	13.0	5	10	28	7	14.5
GTOT	25	56.9 N	09.1 W	18	24	M 22	10 NM	15	0996.8	12.4	13.2	6	8	28	10	23
WRVM	25	13.4 N	70.5 W	18	10	30	10 NM	02	1014.5	31.1	29.4	4	8	10	6	24.5
9VBG	26	27.6 N	46.6 W	06	13	M 39	10 NM	01	1021.0	25.0	26.0					
EWAK	26	43.0 N	65.5 W	06	12	35	5 NM		1009.7	16.0	18.0					
GTOT	26	50.2 N	08.9 W	06	27	M 17	> 25 NM	03	0993.2	11.8	13.2	4	6.5	24	8	23
KFEY	26	49.3 N	18.4 W	06	32	M 35	10 NM	03	1012.5	14.0	17.7	5	13	32	12	18
VRKB	26	49.5 N	25.9 W	06	01	M 61		01	1018.8	15.1						
FNBA	26	42.5 N	64.3 W	12	26	M 48	5 NM	02	0999.0	16.9	17.4	4	8	23	7	10
S6CC	26	42.3 N	63.6 W	12	24	M 35	5 NM		1003.6	18.0						
GUEG	26	23.1 N	66.5 W	18	08	M 08	> 25 NM	16	1017.6	32.4	31.0	3	5	11	60	34.5
GVHY	26	44.2 N	58.5 W	18	23	M 37	2 NM	25	0998.4	16.8	18.3	7	11.5			
KFDV	26	40.3 N	58.3 W	18	25	M 35	5 NM	03	1009.5	25.0	25.0	8	10	25	27	13
KHRK	26	48.1 N	13.1 W	18	33	M 32	10 NM	02	1011.2	16.5	17.0	6	6.5	30	8	19.5
KNBD	26	43.7 N	60.6 W	18	26	M 30	2 NM	50	0999.4	17.5	17.2	3	10	23	6	19.5
LFMO	26	44.7 N	58.4 W	18	25	45	5 NM		0995.8	17.5	17.9	6	13			
RIGG	26	43.9 N	59.6 W	18	25	M 44	2 NM	10	0998.8	19.3	15.6	6	8	21	9	11.5
SGBL	26	32.8 N	13.7 W	18	36	M 35	10 NM	03	1017.5	24.2		2	3	34	7	8
VOXG	26	44.7 N	62.0 W	18	31	M 41	10 NM	01	0999.8	17.1	16.1					
KFDV	27	40.2 N	59.1 W	00	28	32	10 NM	03	1014.9	21.1	23.9	10	14.5	28	12	19.5
KHRK	27	47.4 N	15.8 W	00	32	M 21	10 NM	02	1017.1	16.0	18.0	6	6.5	30	8	19.5
LFMO	27	44.7 N	58.4 W	00	31	42			1005.2	17.0	17.0	7	13	24	6	5
WVFN	27	48.2 N	50.4 W	09	27	41	5 NM		0997.4	13.3	13.2	7	10			
9VPR	27	44.3 N	43.8 W	12	26	M 36	5 NM	03	1012.7	21.0	22.0	6	16.5	25	12	19.5
DILL	27	47.3 N	48.2 W	12	26	45	5 NM		1003.9	14.3	14.0	8	14.5	26	10	23
FNMP	27	52.5 N	52.6 W	12	35	M 39	2 NM	62	0993.6	7.6	6.0	7	6.5	36	7	6.5
KFCS	27	46.5 N	51.3 W	12	25	35	5 NM	02	1008.0	14.4	14.4	4	13	25	6	13
KFCV	27	44.6 N	45.5 W	12	22	22	10 NM	01	1012.0	20.0	16.0	22	36	06	6	8
RIGG	27	47.5 N	48.2 W	12	27	44	5 NM		1002.6	13.8	12.4	8	14.5			
UFPS	27	21.0 N	18.3 W	12	05	M 35	10 NM	02	1015.0	23.0	22.0	5	6.5			
UYBB	27	46.3 N	45.1 W	12	21	M 37	5 NM	02	1005.9	15.2	14.0	8	13			
VOBJ	27	47.4 N	49.2 W	12	28	36	10 NM		1003.0	14.0						
VRIE	27	42.4 N	34.6 W	12	26	M 50	10 NM	02	1023.0	23.0		4	1.5	24	8	5
DHES	27	48.6 N	47.9 W	18	25	M 37	5 NM	02	1004.1	13.7	12.0	5	11.5	25	6	11.5
FNLL	27	30.8 N	23.0 W	18	04	35	> 25 NM		1024.1	22.2	23.2	5	8			
UETZ	27	50.0 N	41.3 W	18	25	37			0994.9	14.8	12.1	12	11.5			
EOWZ	28	59.5 N	34.5 W	00	11	35	10 NM		0999.0	7.0	9.1	6	5			
GOOF	28	53.0 N	45.9 W	06	30	M 40	5 NM	02	1003.5	10.6	11.6					

Nationality	Date	Position of Ship Lat. deg.	Position of Ship Long. deg.	Time GMT	Wind Dir. 10°	Wind Speed kt.	Visibility n. mi.	Present Weather code	Pressure mb.	Temperature °C Air	Temperature °C Sea	Sea Waves Period sec.	Sea Waves Height ft.	Swell Waves Dir. 10°	Swell Waves Period sec.	Swell Waves Height ft.
ATLANTIC	AUG.															
UTJY	28	58.4 N	35.0 W	06	09	M 39	10 NM		0991.7	8.0	8.2	12	16.5			
C7C	28	52.7 N	35.5 W	09	25	M 48	5 NM	02	0994.7	11.6	11.2	16	28			
PGEF	28	56.0 N	50.2 W	09	12	35	5 NM		0999.5	4.8	3.8	6	5			
FNHP	28	54.7 N	45.8 W	12	04	M 19	5 NM	02	1008.5	9.2		7	10	01	10	26
FNZE	28	49.4 N	38.1 W	12	27	M 35	10 NM	03	1013.5	16.5	16.0	6	19.5			
UETZ	28	50.8 N	37.5 W	12	25	37	2 NM		1009.4	15.6	12.2	12	6.5			
VRNP	28	53.5 N	27.3 W	12	24	M 44	5 NM		0994.5	13.5	13.7	4	8	25	6	19.5
VX9255	28	49.9 N	63.8 W	12	26	35	10 NM	01	1003.0	9.0						
VYSM	28	47.1 N	61.7 W	12	29	M 35	2 NM	63	1005.0	14.0						
DLCC	28	55.9 N	15.0 W	15	18	M 42	.5 NM	64	1001.2	14.1	13.1	9	10	18	12	10
GVHY	28	44.2 N	58.5 W	15	20	35	5 NM		1011.2	19.0		5	5			
VGLZ	28	49.2 N	67.5 W	15	25	35	10 NM		1006.0	10.0						
ESSR	28	59.8 N	33.2 W	18	05	M 31	10 NM	02	0999.7	9.5	8.3	9	24.5			
WNGR	28	39.0 N	72.2 W	18	04	M 18	5 NM		1016.0	23.0	20.2	2	6.5	35	34	55.5
VGBK	28	50.0 N	64.6 W	18	25	40	10 NM		1003.6	8.5						
XCTR	28	38.5 N	60.0 W	18	22	M 41	2 NM	51	1018.0	24.0	27.5	4	5	19	6	8
FNHP	29	55.4 N	42.6 W	00	08	M 06	5 NM	02	1014.5	9.2	6.7	7	13	07	10	23
VCDC	29	57.9 N	59.9 W	00	16	M 77	2 NM	65	0981.0	3.0						
DSIC	29	59.1 N	62.2 W	03	04	M 45	1 NM	65	0978.3	4.0		8	14.5			
UHAJ	29	53.5 N	18.8 W	06	28	M 39				14.0	12.0	6	19.5			
VC9450	29	45.0 N	59.5 W	06	27	46	5 NM		1008.0	11.0						
VRFZ	29	48.9 N	22.9 W	06	29	M 33	10 NM	25	1019.9	15.0	15.0	6	11.5	28	7	19.5
DBFN	29	58.3 N	01.2 W	09	18	36	5 NM		1006.3	13.3	12.6	5	10			
GNNZ	29	52.4 N	05.4 W	12	20	M 35			1011.2	17.5						
NUOP	29	47.8 N	27.5 W	12	29	M 35	10 NM	02	1030.0	15.0	17.7	2	13	28	3	18
PGED	29	38.5 N	16.1 W	12	03	M 41	10 NM	15	1024.0	21.4	20.7	4	5			
PGEF	29	56.0 N	58.2 W	12	21	M 35	5 NM	61	0982.7	4.0	3.4	7	10			
PJAF	29	37.1 N	69.8 W	12	04	44	10 NM		1022.3	20.3	29.2	7	10	02	7	8
VGFP	29	57.9 N	55.4 W	12	17	36	5 NM		0987.0	9.0						
DGCE	29	46.0 N	28.8 W	15	30	07	10 NM		1032.2	18.5	18.0	1	1.5	26	8	23
OLCC	29	57.1 N	20.0 W	15	32	M 50	10 NM	16	1009.5	13.0	13.3	8	10	32	11	13
C62802	29	52.0 N	55.9 W	18	21	40	10 NM		1003.9	12.8	9.0					
TFTV	29	57.2 N	15.7 W	18	31	M 44	2 NM	16	1004.3	12.1						
DSIC	30	59.1 N	62.2 W	00	30	M 42	2 NM	61	0986.5	3.3		6	13	09	9	6.5
GUDS	30	57.0 N	14.3 W	00	33	M 40	5 NM	81	1013.0	13.2	14.3	5	13			
WLGP	30	14.9 N	80.9 W	00	05	M 12	5 NM	03	1018.8	27.2	28.9	6	5	05	6	32.5
LOMR	30	58.8 N	60.5 W	03	31	M 38	2 NM	61	0989.5	2.1	0.3	5	11.5			
GXEV	30	23.4 N	62.6 W	06	12	M 49	> 25 NM									
TFAB	30	58.1 N	11.3 W	06	33	M 37	2 NM	20	0991.0	12.0						
TFTV	30	55.3 N	14.0 W	06	33	M 37	5 NM	15	1023.1	12.6						
VC9450	30	49.6 N	59.4 W	06	25	79	5 NM		1010.0							
UBFB	30	55.9 N	07.8 W	09	32	55	2 NM			11.7						
DBFP	30	57.3 N	08.4 W	09	33	40	2 NM		1011.5	12.3	13.0	12	13			
FNLL	30	35.1 N	21.7 W	12	03	M 40	1 NM	81	1025.7	22.9	22.9	6	6.5			
CGDR	30	49.8 N	55.4 W	18	05	M 54	10 NM	22								
DBFR	30	59.5 N	03.0 W	18	34	M 43	2 NM	90	1026.2	10.4	12.9	8	16.5			
DLBB	30	58.7 N	07.6 W	18	33	37	5 NM		1018.3	10.2						
VXIE	30	31.2 N	10.4 W	18	35	M 53	10 NM									
KFCX	31	49.2 N	11.9 W	00	34	20	10 NM	02	1033.0	15.0	16.7	3	8	32	5	19.5
UUFI	31	58.7 N	01.3 W	00	34	M 35			1012.1	12.0						
WNDJ	31	49.5 N	11.2 W	00	31	22	10 NM	01	1030.1	14.4	16.7	10	19.5	27	11	21
UMVN	31	42.9 N	11.1 W	06	03	35	5 NM		1027.4	16.0	19.0	6	10			
FNLL	31	34.8 N	20.1 W	12	04	35	> 25 NM		1024.1	20.9	22.6	6	10			
VOBJ	31	46.3 N	47.8 W	12	02	35	10 NM		1028.0	12.0						
CGBP	31	47.4 N	61.8 W	18	22	35			1017.0	13.0						
DGPF	31	40.5 N	11.1 W	18	03	37	10 NM		1021.5	19.9	19.0	5	6.5	35	7	8
EVER	31	41.1 N	14.6 W	18	01	37	10 NM		1015.6	15.1	19.0	7	6.5			
ESSR	31	59.6 N	33.2 W	18	25	M 35	10 NM	00	1013.9	8.1						
GVAH	31	18.9 N	39.4 W	18	08	M 37	2 NM	80	1006.7	25.0		0	50.5	08	10	23
JEXF	31	49.0 N	10.8 W	18	29	39	2 NM		1029.0	16.0	16.5	4	5	30	10	11.5
PUFT	31	39.5 N	13.3 W	18	03	40	10 NM		1019.8	19.3	20.2	8	19.5			
PHUL	31	38.6 N	11.7 W	18	02	34	5 NM		1018.8	19.7	19.6	10	19.5			
GR. LAKES	AUG.															
CE2566	2	41.6 N	81.7 W	00	04	M 30				14.0		0	0			
W027049	9	46.8 N	84.9 W	18	29	M 41	10 NM	15		10.0	17.0	5	5			
VYRF	21	43.0 N	82.3 W	12	05	35	10 NM	21		15.0		10	5			
W42806	25	42.0 N	87.0 W	06	33	M 36	10 NM	01		15.0						
ATLANTIC	SEP.															
GYJE	1	41.0 N	09.7 W	00	36	30	10 NM	02	1020.0	17.5		4	10	36	8	29.5
VTYK	3	35.8 N	08.2 W	18	00	M 60	10 NM	02	1017.0	24.4	24.0	4	6.5	07	8	10
EWXZ	5	22.9 N	17.1 W	06	26	78	10 NM		1014.6	21.0						
FNTH	5	51.2 N	13.1 W	12	31	M 50	1 NM	10	1008.5	12.6	15.7	7	26			
OVOH	5	59.4 N	46.1 W	18	11	M 72	10 NM		1006.0							
OVOH	6	58.8 N	45.1 W	00	05	M 72	10 NM		1010.5	5.0						
LITA	7	18.9 N	66.0 W	06	08	M 50	> 25 NM	02	1013.7	27.0						
JLNO	7	36.0 N	65.7 W	12	01	M 70	5 NM	02	1023.0	27.0	20.0	5	6.5			
WVFN	8	48.2 N	50.4 W	03	32	48	5 NM		1012.6	9.5	12.0	6	8			
NNAC	8	36.9 N	76.1 W	06	01	77	10 NM		1022.7		25.5					
OVOH	9	59.1 N	16.4 W	06	12	M 72	5 NM		0996.4	11.8						
7JNO	9	58.2 N	14.8 W	18	23	60	5 NM		0993.0	14.0	12.5	4	8	22	6	18
ABJP	9	57.7 N	07.8 W	18	19	M 48			1006.5	14.0	14.0	3	6.5	10	6	8
SCDH	9	59.4 N	10.5 W	18	18	M 54	1 NM	20	0997.2	12.3	14.0					
WGMU	9	24.7 N	56.7 W	18	12	08	10 NM		1010.0	27.8	28.9	2	1.5	10	0	49

WE OF NOAA ARE MAKING USE OF THIS SMALL AMOUNT OF SPACE TO EXTEND OUR THANKS TO ALL THE SHIPS' OFFICERS WHO ROUTINELY TAKE SHIPBOARD WEATHER OBSERVATIONS. TO US, THESE EXCELLENT OBSERVATIONS ARE PRICELESS. WE CERTAINLY DO APPRECIATE RECEIVING THEM REGULARLY.

Nationality	Date	Position of Ship Lat. deg.	Position of Ship Long. deg.	Time GMT	Wind Dir. 10°	Wind Speed kt.	Visibility n. mi.	Present Weather code	Pressure mb.	Temperature °C Air	Temperature °C Sea	Sea Waves† Period sec.	Sea Waves† Height ft.	Swell Waves Dir. 10°	Swell Waves Period sec.*	Swell Waves Height ft.
ATLANTIC	SEP.															
UOUP	10	30.4 N	52.6 W	00	23	M 06	10 NM	01	1020.8	26.0	25.0	8	1.5	14	8	36
OVOK	10	59.4 N	07.2 W	06	32	M 80	10 NM		1006.2							
9VPR	10	42.9 N	36.1 W	12	20	M 43	2 NM	81	1004.5	23.0	20.5	7	21	25	13	26
SCDM	10	59.4 N	14.4 W	12	22	M 75	2 NM	64	0990.0	10.5						
DEES	10	59.2 N	19.0 W	15	26	M 63	2 NM	07	0995.9	9.2	11.1	8	16.5	25	18	32.5
TFAR	10	59.5 N	14.6 W	18	26	M 52	.5 NM	64	0976.0	10.0						
KRJK	11	27.8 N	92.3 W	06	16	50	5 NM	03	1007.0	27.0						
LFMO	11	44.7 N	58.4 W	09	29	66	5 NM	02	1009.0	16.8	16.0	6	6.5			
NHAR	11	28.6 N	95.0 W	09	27	M 48	5 NM	25	1000.5	24.3	28.8	3	6.5	17	5	8
VRFZ	12	44.6 N	54.4 W	06	01	58		02	1019.4		16.0					
NUOP	12	57.5 N	40.1 W	12	05	50	5 NM	91	0995.5	6.1	10.0	8	19.5	05	10	49
SHJA	12	56.5 N	16.4 W	12	32	M 58	2 NM	50	1014.5	12.0						
EVBZ	12	05.1 N	04.1 W	18	02	M 78			1016.0							
WVFX	13	45.4 N	42.2 W	12	33	M 55	5 NM	14	1016.0	13.3	21.1	4	6.5	33	8	11.5
NUOP	13	52.9 N	37.5 W	18	02	22	5 NM	01	1008.9	8.9	11.1	5	5	02	7	24.5
NUOP	14	51.8 N	35.5 W	00	01	18	5 NM	01	1011.0	8.9	11.1	5	10	02	7	24.5
UDXL	14	36.0 N	05.0 W	18	02	M 78			1021.0		23.0	6	6.5			
GBFH	15	57.8 N	01.5 W	00	21	M 62	10 NM	01	1012.4	14.0	12.5	3	6.5	25	6	8
GXEW	15	27.9 N	64.8 W	00	02	68	10 NM		1021.9							
NLZL	17	24.5 N	80.6 W	06	02	77	10 NM				30.0					
GCHZ	18	29.5 N	78.3 W	00	15	M 77	5 NM	01	1013.3	26.7	30.0					
DILT	18	39.2 N	60.0 W	03	15	M 64	50 YD	65		24.3						
GPIU	18	49.9 N	08.3 W	12	35	M 02	2 NM	25	1016.2	16.3	17.4	1	1.5	34	10	54
WLCC	18	41.8 N	59.3 W	12	03	M 50	50 YD	07		21.7	19.4	5	16.5	XX	10	39
GOCE	19	29.2 N	66.4 W	06	24	M 13	10 NM	15	1013.6	27.0	27.2	5	5	31	9	32.5
FAHM	19	47.1 N	52.2 W	09	31	M 54	5 NM	60		12.3	10.9	3	8	17	10	16.5
DILT	19	41.0 N	51.8 W	18	02	M 64	10 NM									
UCZP	20	31.8 N	49.8 W	06	10	62	200 YD		1026.4	26.0	25.6	5	6.5			
PLAT	20	58.1 N	03.1 W	18	25	M 48	5 NM	02	0980.3	9.8		5	6.5			
NOHP	21	26.1 N	78.1 W	06	20	59	10 NM		1015.9	26.7	28.9					
ABYC	21	05.7 N	42.8 W	18	01	M 51	10 NM	18	1012.1	27.7		3	3	14	8	6.5
VYYY	22	39.7 N	38.1 W	12	31	56	10 NM		1025.0	26.0						
GNHE	23	24.4 N	17.3 W	00	02	72	10 NM	02								
ESSP	23	55.0 N	34.3 W	06	29	M 35			0996.1	5.0	9.1	10	32.5			
DILT	23	45.5 N	28.0 W	12	01	M 57	10 NM	02			18.0	5	8	28	7	8
DEBS	23	53.3 N	34.8 W	15	30	M 48	10 NM	25	1003.8	6.9	10.2	5	13	30	12	19.5
GOOP	23	52.0 N	17.9 W	18	26	M 62	5 NM	64	0992.7	11.0	15.0	5	10	24	6	10
GCUF	23	52.9 N	26.1 W	18	27	M 60	2 NM	25	0990.2	9.0	13.6	3	10	29	10	23
FNZF	24	50.8 N	26.5 W	06	28	M 40	10 NM	03	0994.5	10.0	12.0	9	32.5			
VRNP	24	50.5 N	29.1 W	12	30	M 53	5 NM		1000.9	11.8	13.3	3	10	30	6	23
HPFY	24	46.3 N	24.2 W	18	32	M 52	5 NM	25	1015.6	14.3	16.4					
KFCC	24	46.3 N	24.9 W	18	32	40	5 NM	18	1004.7	12.2	16.1	7	11.5	32	12	32.5
PJBV	24	48.8 N	23.9 W	18	31	44	10 NM		0998.5	14.0	14.5	7	19.5	31	12	26
GCHC	25	47.7 N	16.9 W	06	29	M 37	10 NM		0990.9	12.2	17.8	5	10	32	12	24.5
DILL	25	47.2 N	19.3 W	09	29	M 48	5 NM	25		15.8	17.0	7	11.5	33	9	23
KFCC	25	47.4 N	25.0 W	12	28	41	5 NM	00	1010.0	14.4	16.1	7	16.5	33	12	29.5
GUSW	25	50.8 N	22.8 W	18	32	M 36	5 NM	25	1000.2	12.3		9	21	32	12	26
GZOC	25	56.5 N	07.7 W	18	13	M 35	10 NM		0993.5	12.6	13.3	4	10	15	8	24.5
ONAC	25	50.4 N	09.0 W	18	22	M 48	5 NM	07	0986.9	14.2	14.2	5	6.5	24	10	16.5
GWHE	26	43.7 N	04.3 W	12	27	M 26	10 NM	02	1016.5	20.2	20.4	4	6.5	33	17	32.5
9VIP	26	45.5 N	19.4 W	15	27	29	10 NM	15	1003.2	17.7	18.0	8	13	29	10	26
DHEC	26	49.7 N	09.7 W	18	25	05	10 NM		1021.2	19.0	17.0	1	0	33	16	26
GDRH	26	57.6 N	01.0 W	18	19	M 48	10 NM	02	0990.6	13.0	13.5	4	10	17	5	10
GOZE	26	46.2 N	07.0 W	18	25	M 18	10 NM	15	1011.6	17.2	18.7	2	3	30	8	29.5
FNTO	27	46.6 N	03.5 W	06	22	M 58	5 NM	60	1010.4	16.7	19.0	6	8	30	10	10
GOZE	27	48.7 N	04.9 W	06	19	M 34	5 NM	25	1000.6	15.0	18.9	3	6.5	29	12	26
ONNP	27	36.1 N	15.0 W	12	25	12	10 NM		1023.0	21.0	20.7	1	1.5	33	10	26
DSIC	28	59.1 N	62.2 W	03	28	53	5 NM		0990.6	1.2	1.5	7	6.5			
PCFT	28	59.8 N	57.9 W	12	30	M 54	2 NM	70	0991.0	1.9	6.0	8	23			
PCEF	28	56.0 N	58.2 W	15	26	40	10 NM		1007.7	1.5	2.4	6	24.5			
GCMM	29	57.7 N	07.8 W	18	20	52	5 NM	81	0983.8	10.9	11.7	9	11.5	00	0	0
PCFT	29	58.2 N	50.9 W	06	30	M 49	5 NM	02	0990.0	3.3	4.9					
ESSP	29	52.4 N	31.6 W	18	29	M 31	1 NM	51	0982.7	5.5	9.4	10	26			
GPKK	29	52.6 N	04.4 W	18	23	M 12	10 NM	02	1013.1	14.6	14.4	3	3	24	8	41
SOLM	30	46.2 N	21.3 W	00	20	M 48	1 NM	82	1003.0	14.5	17.0	2	19.5	21	7	21
SFVA	30	48.0 N	22.8 W	00	27	M 78	5 NM	02	1000.0		17.0					
OHNE	30	51.7 N	35.5 W	12	28	M 52	5 NM	25	0980.0	6.8	10.5	16	16.5			
ONLP	30	50.8 N	22.6 W	12	22	M 23	5 NM		0991.5	10.7	13.0	6	29.5	25	11	23
PCFT	30	56.2 N	40.8 W	12	31	M 60			0977.0	5.0	6.0	11	37.5			
C7C	30	52.7 N	35.5 W	18	28	M 45	2 NM	80	0976.9	7.8	10.7	12	21	29	16	26
DJJR	30	43.9 N	41.0 W	18	31	M 44	10 NM	00	1004.7	11.7	18.5	7	19.5	31	11	29.5
EREA	30	51.9 N	33.8 W	18	27	M 48	5 NM	25	0976.1	5.3	10.3	14	23	29	16	29.5
EPET	30	50.0 N	13.0 W	18	22	M 14	10 NM	02	1000.7	13.3	14.5	3	3	23	15	24.5
ESSP	30	52.3 N	32.2 W	18	26	M 37	5 NM	02	0972.6	8.0	9.6	11	32.5			
FAHM	30	55.6 N	30.7 W	18	21	M 54	1 NM	19	0956.0	6.6	9.9	8	39			
FNZF	30	48.1 N	42.1 W	19	29	M 48	5 NM	02	1010.3	8.3	15.0	9	26			
OWUM	30	59.6 N	35.4 W	18	04	M 45	2 NM	16	0960.5	0.7	7.5	10	24.5			
UPAC	30	54.5 N	44.3 W	18	31	45	1 NM	81	0995.3	4.5	7.6	6	6.5	31	10	29.5

North Pacific Selected Gale and Wave Observations

July, August and September 1982

Nationality	Date	Position of Ship Lat. deg.	Position of Ship Long. deg.	Time GMT	Wind Dir. 10°	Wind Speed kt.	Visibility n. mi.	Present Weather code	Pressure mb.	Temperature °C. Air	Temperature °C. Sea	Sea Waves† Period sec.	Sea Waves† Height ft.	Swell Waves Dir. 10°	Swell Waves Period sec.*	Swell Waves Height ft.
PACIFIC	JULY															
Y5BO	1	20.1 N	121.7 E	12	23	M 43	5 NM	03	1000.0	29.8		6	3	23	8	13
C6DC	1	26.1 N	120.7 E	18	04	39		21	1003.0	22.5						
46020	1	55.9 N	168.0 W	21	01	M 67			0993.6	6.5	6.5					
8KSB	2	51.0 N	160.6 W	00	11	M 42	.5 NM	59	0994.9	8.5	6.5	4	8	12	7	10
BPR	2	36.7 N	123.3 E	00	02	43										
UMIY	2	51.3 N	147.3 W	00	23	02	10 NM	44	1021.7	9.5	10.0	3	1.5	25	11	24.5
BPGB	2	36.7 N	122.9 E	12	02	54										
KGBD	2	26.6 N	126.0 E	12	07	M 35	5 NM	80	0997.8	25.0	26.1	4	5	08	6	10
46020	2	55.9 N	168.0 W	15	36	M 69			0984.7	5.7	6.1					
JERS	2	26.6 N	133.0 E	15	13	M 35	2 NM	63	1000.5	23.0	24.0	5	8	16	8	13
H3SY	2	51.0 N	179.9 W	18	27	M 38			0998.4	8.5	6.0	7	14.5	26	7	14.5
ARDH	2	53.7 N	179.4 W	18	32	38	5 NM	61	0995.0	6.1	6.7	3	11.5	32	5	16.5
7JYW	3	38.2 N	171.5 E	00	18	M 40	.25 NM	51	0998.0	21.5	18.5	3	5	18	9	10
OBUT	3	29.0 N	130.8 E	00	08	M 36	10 NM	25	1003.7	24.6	21.5	7	10	11	10	10
EUEM	3	36.8 N	171.4 E	00	19	M 39	2 NM	07	1011.9		19.7	7	26			
FNJN	3	30.4 N	129.9 E	00	07	M 60	10 NM	02	1003.0	26.0	30.0	6	11.5			
ARDH	3	51.9 N	174.5 E	06	27	35	5 NM	03	1011.5	6.7	6.7	3	10	27	5	6.5
46020	3	55.9 N	168.0 W	09	36	M 51			0986.4	5.7	6.5					
6PRR	3	33.6 N	129.2 E	12	02	39										
WSVR	3	15.0 N	95.4 W	18	36	30	10 NM	01	1011.0	30.0	30.0	6	13	36	8	19.5
9VAR	4	27.3 N	126.0 E	00	02	M 65	5 NM	02	1006.0							
HCAA	4	31.5 N	158.9 E	00	20	M 32	2 NM	60	1002.5	25.9	24.0	10	18	23	10	19.5
JOZA	4	33.3 N	140.3 W	00	30	36	10 NM		1021.5	22.5		4	5	31	6	5
JPVO	4	33.4 N	154.4 E	00	05	M 46	5 NM	25	1003.3	20.0	22.0	4	10	06	7	10
SIGR	4	42.3 N	179.9 W	00	33	37	5 NM		1018.5	8.8		3	3	35	6	6.5
WGKF	4	50.5 N	137.2 W	00	17	M 35	1 NM	65	1003.8	13.0	11.0	4	5	17	7	10
46020	4	55.9 N	168.0 W	06	01	M 60			1002.8	7.7	7.0					
OXFU	4	34.7 N	159.3 E	06	05	M 44	2 NM	63	1006.3	19.6		9	13			
6PGB	4	38.2 N	122.2 E	12	02	37										
BPLO	4	29.3 N	142.9 E	12	18	37	10 NM		1007.9	24.0						
GOQH	5	35.6 N	169.5 E	00	06	M 37	2 NM	62	1003.4	18.4	20.2	5	6.5	28	8	10
UOHU	5	35.5 N	169.7 E	00	08	M 35	1 NM	63	1000.0	20.0	23.0	5	5			
WNFJ	5	48.0 N	131.9 W	00	29	25	10 NM	01	1015.0	17.0	13.9	5	10	30	8	19.5
46020	5	55.9 N	168.0 W	06	01	M 79			1003.3	6.5	7.3					
WTST	5	43.3 N	150.7 W	06	28	M 40	5 NM		1011.8	14.4	13.9	4	8	28	8	14.5
JCPY	5	37.4 N	177.9 E	12	22	M 38	.25 NM	63	1000.0	21.0	16.5	5	11.5	19	8	16.5
DZGM	5	52.1 N	135.3 W	18	15	M 35	1 NM	61	0999.5	11.0	14.0	12	13	15	13	19.5
WJGO	5	55.0 N	138.4 W	18	13	M 35	5 NM	50	0998.0	8.9	9.4	4	5	15	5	10
WSRP	5	53.7 N	138.2 W	18	13	M 40			0996.0	10.6	9.4	3	8	14	6	13
D9IH	5	43.9 N	155.4 E	21	24	M 35	50 YD	45	1012.5	12.0	14.0	XX	10			
JEES	6	42.2 N	170.3 W	00	21	M 28	2 NM	07	0992.5	15.0	12.0	3	6.5	12	9	19.5
JCUF	6	45.1 N	152.2 W	00	29	M 15	10 NM	02	1024.0	18.5	10.0	5	3	27	6	32.5
WJGO	6	54.1 N	136.1 W	00	14	M 35	2 NM	63	0996.0	10.6	12.2	4	5	14	5	19.5
6OTT	6	37.0 N	123.2 E	12	02	74										
GULU	6	51.1 N	155.7 W	18	14	35	.25 NM	81	0997.0	8.0	2.5	6	10	14	9	11.5
GWIK	6	46.7 N	167.3 W	18	32	35	10 NM	58	1005.0	7.3	8.0	8	14.5	35	9	14.5
H8AD	6	46.5 N	153.5 W	21	35	M 15	10 NM	02	1010.2	6.4	5.0	8	6.5	31	5	19.5
D7XR	7	46.4 N	162.5 W	00	27	35			1008.0	10.0		8	8	27	16	32.5
JDWH	7	45.3 N	153.7 W	00	24	M 41	2 NM	52	1002.0	13.9	13.0	5	11.5	22	8	18
JJIP	7	46.2 N	159.6 W	00	30	M 42	.5 NM		1002.0	10.0	19.0	15	32.5	26	20	32.5
JHZL	7	52.7 N	154.6 W	00	15	M 38	.25 NM	65	0991.5	7.5	9.0	8	10			
NPHO	7	38.4 N	122.1 E	00	02	39										
WTST	7	45.4 N	166.6 W	00	28	M 37	10 NM	02	1013.8	8.9	9.5	4	6.5	27	8	11.5
OXFB	7	45.4 N	153.2 W	06	29	35	5 NM	02	1006.5	12.2		4	6.5	28	9	14.5
7JKS	7	35.2 N	142.9 E	12	16	M 37	.5 NM	60	1004.0	21.0	23.0	6	10	19	8	6.5
DSHS	7	51.0 N	156.4 W	12	27	M 35	5 NM	03	0997.7	6.0	7.0	10	14.5	35	10	14.5
URHJ	7	46.8 N	152.8 E	12	31	M 35	> 25 NM	03	1007.2	16.1	11.0	6	5	35	3	1.5
H3YO	7	50.5 N	157.1 W	18	29	M 37			1002.3	9.0	6.5	5	5	29	3	8
46020	7	55.9 N	168.0 W	00	36	M 54			1009.1	7.3	7.7					
CYWK	8	51.4 N	132.2 W	00	15	M 35	5 NM		1006.0	12.0						
WSCJ	8	35.0 N	145.1 E	00	27	35	5 NM	02	1000.9	21.7	20.6	3	6.5	27	8	10
KRGA	8	53.0 N	135.0 W	06	12	40	2 NM	63	1009.0	11.0	13.4	5	11.5	12	XX	6.5
OYAT	8	25.1 N	120.9 E	12	02	79	10 NM		1009.7		20.0					
WGWB	8	56.6 N	141.8 W	18	08	M 36	.5 NM	53	0999.0	10.6	13.9	2	5	10	7	11.5
EWGF	9	49.9 N	174.5 E	18	21	M 41	.25 NM	45	1007.8	8.2	6.8	5	6.5	21	8	10
46020	9	55.9 N	168.0 W	15	36	M 77				6.5	7.3					
KHGA	9	50.7 N	132.6 W	18	21	20	2 NM	81	1013.2	13.5	11.7	4	8	27	11	19.5
JHJE	10	42.8 N	159.4 E	09	20	60			1013.0	17.8		1	0	13	8	3
46020	10	55.9 N	168.0 W	21	36	M 75				7.3	7.7					
KGUA	11	35.2 N	122.2 W	06	31	M 35	5 NM	45	1016.9	16.5		3	5	18	4	8
NRPK	11	48.1 N	125.2 W	06	01	61		01	1019.5		13.3			26	7	1.5
46020	11	55.9 N	168.0 W	21	36	M 79				7.7	7.7					
JADC	12	54.3 N	166.4 W	00	14	35	5 NM		1007.1	9.0						
46020	12	55.9 N	168.0 W	06	01	M 77				7.6	7.7					
NOXA	13	54.6 N	166.3 W	00	16	M 35	5 NM	03	1005.5	7.8	8.9	8	5	29	14	6.5
46020	13	55.9 N	168.0 W	06	01	M 62				6.9	7.2					
9VDY	13	51.8 N	168.0 E	06	33	M 21	5 NM	10	1010.0	7.0	7.0	8	10	34	4	19.5
JPWX	13	28.0 N	133.8 E	06	23	M 12	5 NM	01	1014.0	31.0	26.0	3	1.5	14	8	32.5
UNXG	13	35.0 N	123.7 W	12	33	M 43	> 25 NM		1015.5	16.0						
HOLR	14	41.6 N	153.2 W	00	31	M 14	2 NM		1002.4	14.0	15.0	2	1.5	31	10	34.5
ESIJ	14	48.7 N	140.9 E	06	02	50	10 NM				13.8			21	4	3
GRKE	14	13.4 N	124.7 E	06	25	M 45	2 NM	63	0998.0	24.0	27.0	3	13	XX	3	6.5
HPKX	14	12.0 N	90.7 W	18	09	M 37	> 25 NM	02		29.0						
GRKE	15	15.0 N	124.8 E	00	16	M 36	5 NM		1004.1	28.0	27.0	3	10			
OXNS	15	33.1 N	169.3 E	00	20	M 58	10 NM	02	1011.0	25.8	23.5	8	10			
WSNB	15	39.6 N	125.0 W	00	34	35	5 NM	05	1012.0	16.7	12.8	5	6.5	34	6	11.5
JRJO	15	46.9 N	170.1 W	09	19	M 66	1 NM	63	1008.5	10.0	9.0					
APDD	15	09.6 N	85.7 W	12	21	M 05	10 NM	50	1008.0	27.0	30.0	1	1.5	18	10	52.5
KHRP	15	39.2 N	125.8 W	18	05	M 40	5 NM	07	1015.0	16.5	11.0	7	19.5	35	7	19.5
8KSR	16	52.5 N	162.9 W	00	27	M 40	10 NM		1004.0	11.0						
KPKL	16	38.9 N	124.9 W	00	34	40	5 NM	05	1011.0	17.8	15.6	6	11.5	33	8	21
UVCD	16	50.3 N	157.0 E	00	29	35	10 NM	02	1014.9	6.0	8.0	6	6.5			
WUDV	16	27.2 N	174.0 E	06	11	M 06	10 NM	01	1017.3	27.2	25.6	3	1.5	14	10	41
WSVR	16	40.2 N	125.6 W	12	34	40	10 NM	03	1012.9	14.4	13.3	6	10	34	7	10
WEZD	16	39.7 N	127.6 W	18	36	M 37	10 NM	02	1017.2	13.9	15.0	6	13	32	12	16.5
9VRN	17	42.3 N	174.2 W	00	19	M 35	50 YD	45	1020.0	15.5	13.0	5	13	22	7	16.5
7JNB	17	50.0 N	164.1 W	06	21	M 35	.25 NM	51	1014.5	11.5	7.0	5	8	22	8	11.5
D9FE	17	36.4 N	163.6 E	06	05	M 35	5 NM	01	1012.0	20.0	20.0	7	10	05	8	23
JPND	17	51.8 N	167.0 E	06	16	M 16	5 NM	02	1020.0	11.0	8.0	4	3	19	4	19.5
JQWV	17	42.8 N	138.6 E	06	14	M 35	.5 NM	02	1002.0	18.0	3.7			14	9	16.5
JFQU	17	53.3 N	152.3 W	18	23	M 39	5 NM	07	1014.5	10.0	9.0	5	8	25	9	16.5
KGDB	18	38.7 N	125.2 W	00	34	35	5 NM	05	1017.0	15.0	10.0	9	19.5	XX	XX	19.5
JEED	18	40.9 N	153.3 E	06	14	M 30	5 NM	60	1017.0	17.0	19.0	7	10	15	14	19.5
JDWH	18	40.0 N	151.3 E	06	13	M 36	5 NM	21	1011.8	20.0	21.0	4	5	13	7	10
D9FE	18	36.7 N	168.5 E	18	02	M 20	10 NM	01	1015.0	19.0	20.0	4	5	04	6	26
JCDY	19	54.9 N	148.9 W	03	23	70	10 NM		1015.7	9.8	9.0					
VCGD	19	52.5 N	128.5 W	06	05	M 37	1 NM	50	1013.7	11.5	12.0					
JDZE	19	38.3 N	152.3 E	09	14	M 39	200 YD	59	1007.8	20.5	21.5	5	6.5	17	6	8
BPFT	20	38.2 N	121.5 E	00	02	45										
BPGB	20	36.7 N	122.9 E	12	02	58										
GUBM	20	02.2 N	128.1 W	12	02	M 62			1007.5		27.5	4	8			
URMB	20	46.6 N	141.6 E	12	05	54	10 NM									
KGDB	21	52.1 N	136.6 W	00	23	M 35	5 NM	20	1006.2	8.3	5.6	7	18	23	7	18
BPPS	21	34.1 N	122.6 E	12	02	78										
WEZD	21	46.7 N	176.2 W	23	32	M 36	1 NM	51	1007.0	8.9	8.3	5	8	XX	8	10
JBEF	22	45.3 N	177.4 E	00	03	M 41			1018.5	11.0	10.5	4	8	04	8	16.5
JEED	22	46.8 N	168.1 W	06	18	M 43	.5 NM		1012.0	12.0	9.0	8	10	15	12	16.5
JDWH	22	46.5 N	168.5 W	06	17	M 42	.5 NM	65	1011.0	13.0	10.0	6	10	17	7	11.5
JEFI	22	57.9 N	144.7 W	12	19	M 06	5 NM	02	1026.0	12.0	11.0	2	3	21	21	34.5
H9IB	22	54.1 N	159.8 W	23	16	M 38	200 YD		1020.0		8.0	3	5			
D7XP	23	54.0 N	163.0 W	00	23	33	< 50 YD	47	1012.0	9.5	10.0	5	10	23	9	24.5
JDWJ	23	12.3 N	145.4 E	09	18	M 35	50 YD	64	0997.5	26.0	28.0	7	13	20	7	16.5
C6CT	23	39.0 N	124.1 W	12	34	37	5 NM	02	1013.0	11.0						
JLMN	23	11.7 N	145.7 E	12	20	M 40	1 NM	25	0999.5	27.0	30.0	5	6.5	20	8	16.5
WZJC	23	15.4 N	157.6 E	12	12	35	1 NM	01		26.7	27.0	6	13	12	11	16.5
46020	23	55.9 N	168.0 W	21	01	M 49				5.7	6.5					
FNIA	24	31.6 N	131.7 E	00	16	M 35	1 NM	25	1007.0	24.0		2	1.5	16	3	6.5
6YFY	24	06.9 N	81.3 W	00	09	M 80	10 NM	15	1012.3	26.5						
WEZD	24	44.0 N	163.3 E	00	34	M 44	10 NM	01	1011.0	11.1	11.1	5	11.5	36	8	13
46020	24	55.9 N	168.0 W	06	36	M 44				6.5	6.5					
JBXJ	24	39.2 N	131.4 W	06	02	M 35	10 NM	02	1024.9	17.0						
KCKB	24	36.0 N	126.3 W	06	36	35	5 NM	07	1018.5	14.4		2	8	36	8	16.5
YRKH	24	46.9 N	167.3 E	06	30	M 37	.5 NM	60	1011.0	9.0		1	6.5	07	2	13
BPNE	24	33.3 N	122.6 E	12	02	48										
C6CT	24	42.3 N	124.6 W	12	35	42			1012.0	8.0						
KGWT	24	46.7 N	175.9 E	12	10	M 37	2 NM	60	1011.0	8.9	8.4	5	10	10	7	11.5
H9TM	25	51.6 N	136.8 W	00	34	M 25	5 NM	02	1027.9	14.5	10.0	6	19.5	34	6	8
D5TB	25	49.2 N	176.5 E	06	09	M 38	< 50 YD	58	1009.9	10.0	8.0	7	13	10	7	13
JRIO	25	53.8 N	162.0 W	06	34	03	10 NM		1022.9	9.5	8.5	3	3	14	6	32.5
KGWT	25	48.3 N	178.3 E	06	11	M 35	1 NM	50	1005.0	9.4	7.7	7	13	11	9	16.5
WGJF	25	45.4 N	177.9 W	06	15	M 36	.5 NM	12	1008.7	10.7	7.0	8	8	13	9	13

Nationality	Date	Position of Ship Lat. deg.	Position of Ship Long. deg.	Time GMT	Wind Dir. 10°	Wind Speed kt.	Visibility n. mi.	Present Weather code	Pressure mb.	Temperature °C Air	Temperature °C Sea	Sea Waves† Period sec.	Sea Waves† Height ft.	Swell Waves Dir. 10°	Swell Waves Period sec.*	Swell Waves Height ft.
PACIFIC	JULY															
46020	25	55.9 N	168.0 W	09	01	M 71				6.1	6.9					
HPAU	26	16.9 N	101.7 W	00	19	M 12	10 NM	03	1012.9	30.0		3	1.5	19	0	52.5
VRGW	26	44.1 N	178.1 E	00	25	M 40	5 NM	16	1007.7	10.7	10.0	3	8	26	4	13
8KGO	26	11.3 N	149.1 E	03	27	35	2 NM		1001.5	29.0	29.0	7	11.5	28	12	16.5
JCVS	26	15.1 N	149.2 E	06	30	M 38	5 NM	02	1000.5	29.0	30.0	7	10	07	12	14.5
JCZU	26	17.1 N	134.5 E	06	21	M 48	200 YD	62		24.5	29.0	10	13	20	14	24.5
UMAZ	26	54.9 N	163.4 E	06	01	39		00	1001.9		13.0					
wGJF	26	45.6 N	165.6 W	06	17	M 37	1 NM	65	1013.0	14.5	7.0	8	6.5	12	6	5
wNDO	26	52.1 N	132.6 W	06	34	M 35	5 NM	02	1020.9	11.1	12.2	5	11.5	35	8	14.5
7JKY	26	17.4 N	132.3 E	12	22	M 58	200 YD	65		26.0	31.0	4	16.5	23	7	19.5
8OIJ	26	03.5 N	126.5 E	12	20	54	5 NM	00		27.5	31.0	11	10			
wNEJ	26	52.7 N	133.2 W	12	36	M 35	5 NM	03	1020.5	12.5	11.7	5	6.5	33	8	8
46020	26	55.9 N	168.0 W	15	01	M 62				5.0	6.9					
SLCI	26	15.8 N	132.3 E	18	14	M 45	1 NM	81	0999.0	26.5		7	16.5			
CGWQ	26	51.4 N	129.4 W	18	01	40		02	1018.2		12.8					
DZVV	26	42.6 N	165.0 W	18	23	M 12	5 NM	02	1019.5	14.0	14.0	7	5	23	7	29.5
HBJV	26	52.4 N	163.4 W	18	17	M 54	1 NM		1015.9	10.5	9.0	6	16.5	17	9	11.5
KHLD	26	51.9 N	135.5 W	18	35	M 45	5 NM	01	1025.7	12.8	13.3	4	6.5	34	6	6.5
wJGO	26	53.9 N	136.3 W	18	34	M 35	5 NM	02	1025.0	15.0	11.1	4	5	34	5	13
wNFJ	26	51.7 N	135.6 W	18	05	35	5 NM	01	1024.0	14.5	13.3	4	6.5	34	5	18
SLIC	27	16.5 N	133.1 E	00	21	M 33	2 NM	81	1004.5	26.3		5	6.5	26	9	23
ELAW3	27	26.7 N	122.9 E	00	05	M 25	> 25 NM	21	1001.0	29.0	27.0	10	23	15	10	23
HPAU	27	14.8 N	97.5 W	00	25	M 10	10 NM	02	1012.5	30.0		2	1.5	24	0	34.5
7JKY	27	20.8 N	133.3 E	03	15	M 38	10 NM	01	1003.0	28.5	30.0	3	13	17	7	16.5
8KWO	27	13.0 N	146.5 E	03	28	M 27	.5 NM	82	1001.5	28.0	29.0	7	11.5	29	12	19.5
JCVS	27	10.9 N	150.3 E	03	23	M 36	2 NM	60	1003.3	28.5	29.0	7	10	26	12	14.5
SLCT	27	17.5 N	133.4 E	06	18	M 25			1005.0	29.0		5	8	26	11	19.5
JDYJ	27	27.2 N	133.9 E	06	10	M 20	10 NM	02	1010.0	30.0	29.0	3	5	12	7	19.5
KHLD	27	54.5 N	138.1 W	06	34	M 40	1 NM	12	1026.0	11.7	11.7	4	8	35	6	10
JEYH	27	29.1 N	130.5 E	09	10	M 18	10 NM	02	1007.3	29.0	28.5	5	8	14	12	41
JEIT	27	23.7 N	123.7 E	09	25	M 40			0998.0	29.5	29.5	3	6.5	08	7	10
46020	27	55.9 N	168.0 W	15	01	M 49				5.0	6.9					
JRAL	27	24.7 N	133.5 E	15	12	33	2 NM		1010.5	29.0	29.5	5	10	16	8	21
FNFO	28	24.8 N	120.4 E	00	01	46	5 NM		0997.6	28.9	28.6	2	16.5			
JBYJ	28	27.5 N	134.0 E	00	11	M 23	10 NM	02	1012.5	28.5	29.0	3	5	13	7	21
PBDX	28	29.3 N	128.1 E	00	11	M 35	10 NM	80	1007.3	28.4	28.6	3	6.5	19	10	10
DLCN	28	24.2 N	127.5 E	03	13	M 45	2 NM	07	0999.1	29.3	28.5	7	21	19	13	39
JBAL	28	22.7 N	132.7 E	03	14	23	2 NM		1011.5	30.0	29.0	4	8	20	7	19.5
JIXF	28	22.9 N	133.5 E	03	15	M 18	10 NM	02	1008.5	30.0	30.0	6	8	22	15	19.5
3EOU	28	51.6 N	141.7 W	06	08	M 35	5 NM	03	1026.5	10.0	10.0	4	6.5	08	9	14.5
8KGO	28	17.0 N	143.5 E	06	32	M 18	10 NM	01	0999.0	30.0	29.0	7	11.5	30	12	19.5
UAAX	28	26.6 N	125.3 E	06	11	M 25	5 NM	15	1001.4	28.8	28.6	6	10	13	12	23
UHQS	28	18.4 N	120.0 E	06	29	37	10 NM		0994.6	29.6	29.4	9	19.5			
wDZB	28	24.0 N	128.7 E	06	12	M 40	5 NM	07	1001.6	30.0	27.2	XX	16.5	17	XX	24.5
GOYC	28	18.7 N	121.0 E	12	18	36	5 NM	60	0991.5	27.5	26.0	6	10			
JBOV	28	24.4 N	126.6 E	12	13	M 40	2 NM	07	1007.5	29.0	30.0			07	12	23
S6CT	28	25.9 N	122.1 E	12	06	M 42	1 NM	51	0995.0	26.0	28.0					
wGKF	28	28.6 N	126.6 E	12	10	M 27	5 NM	02	1005.3	28.5	28.0	XX	6.5	17	XX	19.5
PGDY	28	27.6 N	124.6 E	15	11	45	10 NM		1003.2	28.6	28.0	5	8	16	12	14.5
46020	28	55.9 N	168.0 W	18	36	M 67				5.7	6.9					
UNTY	28	15.2 N	127.0 W	18	13	M 37	2 NM	07	1004.7	27.0	29.0	10	19.5			
wLRL	28	25.3 N	124.6 E	18	11	45	2 NM	64	0996.5	27.0	28.3	4	13	10	7	19.5
46020	29	55.9 N	168.0 W	00	36	M 54				6.5	7.3					
8LLB	29	33.0 N	136.6 E	00	12	08	5 NM		1017.0	25.8				15	12	19.5
GEVT	29	30.5 N	133.2 E	00	11	08	10 NM		1012.9	27.4	27.2			20	10	26
HPAU	29	10.5 N	88.4 W	00	05	M 20	10 NM	02	1012.0	28.0		3	3	05	0	36
JBOV	29	23.1 N	125.3 E	00	15	M 35	2 NM	07	1006.5	28.0	30.0			14	11	19.5
PBDY	29	26.5 N	123.3 E	00	11	M 72			0996.5	28.8	27.5	6	18	17	12	24.5
S6CT	29	28.0 N	125.5 E	00	11	M 40			1002.5	27.0	29.0	2	14.5	10	3	18
wDZB	29	22.8 N	127.3 E	09	19	M 35	5 NM	07	1003.4	29.0	27.2	XX	16.5	29	XX	24.5
8KQB	29	18.9 N	142.9 E	06	26	35	.5 NM			28.0	30.0	10	16.5	36	10	13
A8JB	29	21.4 N	125.6 E	06	16	50	1 NM		1000.4	27.6	27.9	8	13	25	14	23
DEDZ	29	25.9 N	127.7 E	06	11	M 37	5 NM	02	1004.5	29.0	29.0			12	7	11.5
EREB	29	18.5 N	120.4 E	06	21	M 35	5 NM	06	0997.5	29.3	29.1	8	16.5			
GYLF	29	34.5 N	177.9 W	06	17	66	10 NM									
JDYJ	29	27.8 N	134.2 E	06	08	M 15	10 NM	02	1012.3	30.0	28.5	3	5	22	8	19.5
JKRV	29	21.1 N	145.6 E	06	16	M 53	.25 NM	18		28.0		5	8	15	7	18
UAAX	29	25.7 N	126.2 E	06	14	M 29	5 NM	15	1002.6	29.1	29.2	7	11.5	13	11	26
UMQS	29	18.1 N	120.2 E	06	22	M 35	5 NM	80	0997.4	29.4	29.0	8	18			
wLRL	29	24.9 N	123.6 E	06	13	35			0996.0	28.0	28.3	3	6.5	19	5	14.5
KCBE	29	41.5 N	124.8 W	08	34	35	5 NM	02	1022.0	15.3	14.3	3	6.5	33	4	6.5
JIFS	29	25.2 N	144.7 E	09	04	M 36	1 NM	60	1002.2	28.0	26.0	7	13	13	9	14.5
9VAN	29	25.4 N	124.7 E	12	19	M 39	5 NM	64	1003.5	29.6	29.0					
KHRP	29	25.9 N	124.1 E	12	18	M 38	2 NM	29	1002.0	28.0	28.0	4	19.5	15	8	29.5
C6DC	29	27.2 N	122.9 E	18	14	33	10 NM		0998.4	26.5	24.0	5	13	16	6	23
KHRH	29	22.2 N	120.0 E	18	18	M 54	200 YD	64	0992.5	24.0	29.0	3	16.5	22	5	19.5
ZEGH	29	24.1 N	145.0 E	18	12	M 45	2 NM	25	0999.7	28.0	30.0	3	6.5	13	4	16.5
HPAU	30	08.5 N	84.1 W	00	25	M 12	10 NM	02	1013.2	29.0		3	1.5	XX	0	50.5
JIFS	30	24.1 N	145.6 E	00	15	M 37			1004.8	30.0	28.0	8	13	13	8	13
ZEGH	30	23.4 N	145.1 E	00	15	M 40	5 NM	02		29.0	30.0	3	5	14	4	13
C6DC	30	25.8 N	122.6 E	03	14	M 30	2 NM	64	1004.2	25.4	23.0	4	14.5	14	7	23

Nationality	Date	Position of Ship Lat. deg.	Position of Ship Long. deg.	Time GMT	Wind Dir. 10°	Wind Speed kt.	Visibility n. mi.	Present Weather code	Pressure mb.	Temperature °C Air	Temperature °C Sea	Sea Waves† Period sec.	Sea Waves† Height ft.	Swell Waves Dir. 10°	Swell Waves Period sec.*	Swell Waves Height ft.
PACIFIC	JULY															
8KGO	30	20.9 N	141.8 E	06	18	33	2 NM		0996.0	28.5	30.0	8	13	22	14	26
GWDH	30	24.3 N	126.2 E	06	13	15	10 NM		1003.9	28.8	29.1	3	5	23	10	19.5
JDYJ	30	28.4 N	133.8 E	06	05	M 25	10 NM	02	1008.6	28.0	28.0	3	5	04	8	19.5
JJAD	30	38.0 N	146.2 E	06	22	M 03	5 NM	61	1014.1	21.0	20.0	1	1.5	09	7	32.5
WMDF	30	35.2 N	122.3 W	06	34	38	5 NM	02	1011.0	15.5	17.7					
UAAX	30	25.3 N	123.8 E	06	15	M 23	5 NM	15	1002.6	28.3	26.0	5	6.5	19	11	19.5
JAGX	30	28.8 N	138.9 E	12	08	37	5 NM		1004.0	27.0	26.0	7	13	13	13	23
JFJA	30	28.6 N	140.1 E	12	09	36	5 NM		1002.5	27.0	25.0					
EWSS	31	58.3 N	155.5 E	00	11	M 48	5 NM	01	1017.8	11.8		4	8			
JFJA	31	27.9 N	140.8 E	00	11	37	5 NM		0999.5	26.5	25.5	4	8	10	9	24.5
UTRR	31	26.2 N	121.5 E	00	16	M 35	2 NM	16	1000.3		29.5	6	13			
8KGO	31	23.4 N	140.7 E	03	18	32	1 NM		0997.0	29.5	25.0	8	13	23	12	26
A8JB	31	25.0 N	132.3 E	06	34	68	10 NM		0999.0	29.0	29.0	8	18	05	14	24.5
EWYZ	31	56.5 N	160.3 W	06	27	06	10 NM		1032.7	10.5	6.0	3	1.5	30	60	32.5
ONMH	31	20.8 N	122.6 E	06	22	M 15	10 NM	02	1005.5	28.0	28.0	5	6.5	18	12	19.5
GVUG	31	54.3 N	155.4 E	06	18	M 35	5 NM		1002.0	12.5						
GXXW	31	23.8 N	131.4 E	12	33	M 21	10 NM	02	1002.4			4	5	05	10	19.5
JAGX	31	28.5 N	140.0 E	12	10	M 47	2 NM	07	0997.0	26.0	24.0	10	19.5	17	17	32.5
JIXX	31	16.1 N	129.6 E	12	22	M 35	10 NM	03	1007.2	30.0	31.0	4	6.5	20	5	6.5
JRFS	31	23.9 N	133.5 E	12	30	M 35			0997.0	28.0	28.5					
JERS	31	31.5 N	133.5 E	15	05	M 28	10 NM	02	1004.0	27.0	26.0	5	6.5	13	8	19.5
wNCU	31	36.2 N	135.9 E	18	09	M 40	2 NM	61	1011.6	26.4	27.2	6	8	13	9	10
	AUG.															
HBJV	1	47.3 N	158.4 E	00	21	M 37	2 NM		1021.0	13.5	12.0	4	5	22	8	10
JAGX	1	28.5 N	140.1 E	00	14	M 52	.5 NM	63	0995.0	26.5	24.0	8	26	19	18	39
JRJH	1	24.1 N	147.6 E	00	14	20	10 NM		1015.0	30.5	29.5	3	6.5	29	12	23
JERS	1	29.6 N	132.8 E	00	01	M 34	10 NM	01	0997.0	28.0	26.0	6	8	09	8	23
JFJA	1	26.6 N	141.7 E	00	17	50	2 NM		1003.5	28.0	25.5	5	10	15	10	32.5
ONTU	1	32.4 N	134.9 E	00	04	M 46	5 NM	02	0999.5	24.0		4	16.5	04	8	29.5
wMBH	1	22.7 N	108.5 W	00	34	M 10	10 NM	02	1011.0	30.6	30.0	2	14.5	28	0	49
A8JB	1	27.6 N	132.5 E	06	33	58	10 NM		1000.3	29.0	28.0	4	16.5	06	12	26
GNEM	1	33.5 N	140.4 E	06	12	48	5 NM	60	1001.2	27.4		8	13	16	10	16.5
GXXW	1	25.3 N	134.1 E	06	29	25	10 NM		1002.0			5	10	36	10	29.5
wNCU	1	32.1 N	137.1 E	06	11	M 47	200 YD	63		25.0	27.2	8	16.5	06	6	10
8KGO	1	27.3 N	138.6 E	09	18	30	.5 NM			26.0	25.0	8	13	21	10	23
H9EV	1	51.5 N	167.3 E	12	24	M 35			1013.0	7.0						
ONMD	1	32.3 N	139.9 E	12	16	M 50	.25 NM	65	0993.0	25.5				15	9	32.5
H3YD	1	52.4 N	170.2 E	18	20	M 38	50 YD	47	1009.6	9.5	7.5	8	8	22	8	10
wSCJ	1	33.3 N	121.3 W	18	35	38	10 NM	05	1015.5	16.7	15.6	4	11.5	35	5	19.5
7JVM	2	33.6 N	141.7 E	00	19	32	10 NM	01	1008.0	27.0	27.0	9	19.5	14	10	16.5
9HSS	2	33.0 N	138.5 E	00	18	M 41		07	1009.4	28.0		4	13	17	6	10
8PWW	2	34.5 N	122.6 W	00	02	74										
US2U	2	36.9 N	143.1 E	00	14	M 28	.5 NM	11	1010.0	23.5	17.0	5	5	19	11	37.5
GYXW	2	28.9 N	136.3 E	00	23	M 17	5 NM	02	1011.1			4	6.5	33	9	24.5
JPZD	2	37.5 N	145.3 E	06	16	M 27	5 NM	01	1015.5	24.0	24.0	4	5	20	14	29.5
ERVC	2	41.8 N	142.5 E	06	11	M 35	5 NM	00	1007.8	22.6	17.5	7	10			
VRJH	2	17.3 N	139.7 E	06	09	M 41	10 NM	01	1009.9	27.0						
JJEY	2	36.1 N	144.5 E	12	17	M 17	5 NM	02	1018.6	25.0	24.0	4	5	22	10	19.5
GOYZ	2	35.5 N	147.7 E	18	19	M 19	10 NM	02	1017.9	25.0	22.8	3	5	23	12	19.5
LTQZ	2	40.4 N	150.0 E	18	18	M 18	200 YD	45	1018.0	21.5				23	16	19.5
LTQZ	3	39.6 N	148.8 E	00	18	M 16	.25 NM	47	1018.0	23.5				22	14	19.5
H9IM	3	38.5 N	145.1 E	18	18	M 38	.5 NM		1005.5	22.5	17.0	9	23	18	8	16.5
H9IM	4	37.2 N	144.3 E	00	18	M 37	< 50 YD		1005.5	22.5	17.0	8	16.5	18	6	11.5
JHAO	4	37.7 N	145.3 E	00	34	M 35	50 YD	65	1008.5	24.0	23.0	8	6.5	20	10	16.5
7JNU	4	35.5 N	143.7 E	03	22	M 35	5 NM	01	1006.4	26.0	27.0	6	16.5	20	8	16.5
WLDP	4	24.9 N	172.0 W	06	07	20	10 NM	02	1018.6	26.7	25.6	3	5	06	7	19.5
OULU	4	45.0 N	150.2 W	12	28	40	> 25 NM	02	1008.5	13.2		6	10	25	8	16.5
KPHI	4	43.5 N	140.2 W	18	24	M 35	10 NM	01	1009.5	16.0	15.5	4	5	25	8	10
N6YV	4	47.1 N	176.6 W	18	24	M 17	> 25 NM	12	1017.0	11.1	10.0	2	19.5	29	6	5
VCGD	5	53.3 N	129.1 W	03	35	M 46	5 NM	81	1014.5	12.3	11.7					
KPHI	5	44.4 N	143.8 W	06	29	M 35	10 NM	01	1015.0	14.0	15.0	4	8	28	8	14.5
KSFK	5	44.0 N	129.0 W	11	19	M 50	10 NM	01	1016.4	16.7	16.7	3	10	19	5	13
HOJK	6	20.0 N	125.1 E	00	21	M 37	.5 NM	65	0998.0	25.0						
KFJX	6	39.5 N	149.6 E	00	24	M 51	10 NM	01	1004.2	22.8	20.0					
PPVS	6	14.5 N	95.0 W	06	35	35	5 NM	02	1009.5	28.0	30.0					
UVBE	6	53.2 N	161.4 E	12	01	M 41	.5 NM	41	1009.1		13.0					
SZCJ	6	43.7 N	157.1 W	18	32	M 33	5 NM	02	1026.5	14.0	16.5	4	14.5	32	7	24.5
JJAD	6	49.9 N	137.8 W	18	16	M 38	2 NM	63	1014.5	12.5	11.5	4	6.5	17	7	10
JPFN	6	51.9 N	139.7 W	18	11	M 31	.5 NM	59	1009.0	13.0	12.1	4	8	10	0	44
KACK	6	45.9 N	150.9 W	18	27	30	5 NM	50	1008.0	11.7	13.3	5	10	32	10	23
KPHI	6	45.9 N	156.0 W	18	31	M 36	5 NM	80	1014.2	11.5	12.2	3	11.5	30	6	19.5
KACK	7	47.5 N	150.1 W	00	28	28	5 NM	16	1005.0	11.2	13.4	6	11.5	28	10	23
OWEC	7	18.5 N	124.0 E	03	25	M 48	.25 NM	81	1001.0	26.2	28.0	4	19.5			
ES6W	7	50.8 N	173.0 E	06	04	M 41	1 NM	63	0985.3	6.9	7.7	7	16.5			
GFYZ	7	20.5 N	125.5 E	09	12	M 47	< 50 YD	65	0998.4	24.8	25.7	4	16.5	21	6	24.5
GOYZ	8	19.0 N	124.1 E	06	23	M 27	10 NM	15	1000.8	27.5	28.0	5	11.5	30	7	21
LFDV	8	50.5 N	156.8 E	12	35	35	5 NM	01	1008.2	10.0	11.1	3	8			
wPGE	8	19.2 N	120.4 E	12	24	39	1 NM	92	1001.9	24.4	29.4	4	6.5	29	6	13

Nationality	Date	Position of Ship Lat. deg.	Position of Ship Long. deg.	Time GMT	Wind Dir. 10°	Wind Speed kt.	Visibility n. mi.	Present Weather code	Pressure mb.	Temperature °C Air	Temperature °C Sea	Sea Waves† Period sec.	Sea Waves† Height ft.	Swell Waves Dir. 10°	Swell Waves Period sec.*	Swell Waves Height ft.
PACIFIC	AUG.															
JAMD	8	21.9 N	124.7 E	15	18	M 60	.25 NM	65	0999.7	25.5	28.0	8	16.5	19	12	29.5
GXXW	8	25.2 N	127.7 E	18	15	M 32	10 NM	02	1005.2			5	10	18	7	23
KRDH	9	26.9 N	124.8 E	00	09	M 35	10 NM	15	1002.3	27.8	28.9	4	10	09	6	13
GOVM	9	24.2 N	127.4 E	03	13	M 41	5 NM	25	1004.6	26.8	28.6	6	18	13	8	23
JAMD	9	20.8 N	124.3 E	03	22	M 39	5 NM	60	1000.7	28.0	28.0	8	16.5	22	12	19.5
GXXW	9	24.1 N	127.0 E	06	15	M 40	5 NM		1001.6			6	19.5	20	10	32.5
KHRF	9	26.0 N	123.5 E	09	06	M 55	2 NM	63	0985.0	27.8	27.0	6	13	20	8	16.5
3EYN	9	22.2 N	128.0 E	12	17	M 37			1006.0	28.0	29.0	8	10	18	8	13
WTEA	9	52.2 N	175.7 W	12	28	M 42	5 NM		1002.0	7.5	7.7	3	6.5	25	3	6.5
JPQO	9	57.1 N	164.6 W	18	14	M 35	2 NM	63	1002.7	9.8	10.4	4	6.5	15	7	8
KAAY	9	28.1 N	122.3 E	18	13	35	5 NM	25	0998.3	26.7	27.8	7	13	14	11	19.5
KCAK	9	25.0 N	127.2 E	18	16	33	5 NM	25	1003.3	26.1	27.2	3	16.5	18	5	19.5
FNFO	10	23.1 N	125.9 E	00	19	35	5 NM		1004.6	28.2	29.1	3	19.5			
GOVM	10	22.3 N	125.2 E	00	19	M 30	5 NM	15	1003.3	27.8	27.3	4	16.5	25	7	19.5
GXXW	10	22.9 N	126.1 E	00	19	M 30	10 NM	15	1004.4			5	16.5	23	18	26
JPVJ	10	47.4 N	170.2 W	00	21	M 43			1017.5	12.5	11.0	3	5	22	3	5
DZMP	10	12.5 N	91.5 W	03	33	M 75			1013.2	30.0	32.0	6	8	33	6	8
7JRG	10	22.9 N	122.7 E	06	20	40	2 NM		1006.9	30.0						
KAAY	10	27.5 N	122.7 E	06	06	40	2 NM	15	0986.5	28.3	26.7	8	19.5	14	12	41
KCAK	10	23.7 N	124.8 E	06	20	35	5 NM	60	0999.5	27.2	27.2	4	16.5	20	7	23
WZJG	10	15.6 N	138.8 E	06	06	35	5 NM	02	1004.0	27.2	28.3	6	10	06	4	3
DLDE	10	22.5 N	122.1 E	09	23	45	5 NM	02	0998.4	28.3	27.1	7	10	23	10	13
WDZB	10	24.0 N	124.2 E	09	23	M 68	2 NM		1000.0	28.0	24.9	5	10	20	6	16.5
3EYN	10	21.3 N	123.5 E	12	21	M 36			1003.5	28.5	28.0	9	11.5	21	8	10
JNTM	10	58.0 N	165.5 W	18	25	M 36	5 NM		1000.2	8.5	7.5	6	8	24	10	16.5
WTQM	10	41.8 N	144.9 E	18	06	35	10 NM	58	1011.9	18.8	19.7	3	8			
WDZW	10	23.6 N	126.8 E	18	18	M 39	5 NM		1007.3	27.7	28.3					
KPGL	10	24.9 N	126.3 E	21	18	41	5 NM	81	1001.0	26.7	30.0	4	16.5	18	5	19.5
DSNW	11	34.7 N	121.4 W	00	33	M 36	5 NM	02	1011.5	16.0	12.0	3	6.5			
WNEI	11	27.0 N	124.5 E	06	20	52	50 YD	65	0988.0	22.2	22.2	11	26			
KFOC	11	30.3 N	128.5 E	09	13	M 37	2 NM	63	1007.0		28.0	4	10	13	10	10
KGJB	11	43.7 N	170.3 E	12	16	M 38	50 YD	42	0996.0	16.0	15.0	4	11.5	18	5	8
OYHI	11	27.1 N	126.7 E	12	17	M 47	.5 NM	82	1001.2	28.0	28.0					
EUEM	11	41.9 N	156.0 E	18	34	37	5 NM			15.0						
KPGL	11	27.3 N	126.7 E	18	20	41	5 NM	82	1000.0	27.5	30.0					
JOVT	12	51.4 N	166.7 E	00	12	M 37	.25 NM		0987.5	7.0	7.4	8	16.5	35	8	13
WNEI	12	30.5 N	129.6 E	00	13	38	2 NM	60	1007.8	25.0	25.6	7	16.5			
KPGL	12	27.6 N	126.9 E	03	22	41	2 NM	81	1002.0	27.8	30.0	4	14.5	22	5	19.5
3FOC	12	27.1 N	126.6 E	06	18	M 32	2 NM	22	1004.0	30.0	27.0	4	14.5	20	10	19.5
JBJO	12	47.5 N	165.7 E	12	29	M 36	2 NM	61	0999.0	10.5	10.0					
JRFN	12	50.0 N	175.5 W	12	20	M 36	2 NM	07	0994.2	10.0	10.0					
UIGW	12	52.9 N	167.9 E	12	04	M 39	2 NM			6.0						
VIGW	12	52.9 N	167.8 E	12	04	M 39	2 NM	51	0982.2	6.0	7.0	12	14.5			
JLHO	12	51.8 N	167.7 E	18	34	M 35		53	0993.0	8.5	9.4	4	8	34	7	10
ELIO	13	52.4 N	170.0 E	00	33	M 35	2 NM		0995.4	10.0	8.0	5	8	33	7	8
HBLR	13	50.5 N	165.5 E	00	34	35	2 NM	10	1008.0	10.0	9.0	10	11.5	34	8	10
JDZE	13	49.3 N	175.0 E	00	22	M 38			0997.8	10.5	12.0	7	11.5	23	10	16.5
KGuT	13	50.3 N	175.1 E	00	21	M 34	2 NM	40	0993.6	9.4	11.2	5	19.5	25	7	16.5
UKw	13	49.6 N	142.1 E	00	20	16	5 NM		1007.9	17.9	17.4	4	19.5	18	6	3
KPGL	13	33.1 N	128.5 E	06	13	36	5 NM	92	1010.0	28.3	30.6	5	8	13	6	16.5
WDZB	13	33.0 N	128.4 E	06	17	M 40	2 NM	18	1009.0	27.0	26.7					
HOVS	13	53.2 N	174.4 E	12	32	M 36	2 NM		1004.5	7.8	9.0	6	10	32	10	13
KPGQ	14	24.3 N	130.6 E	00	11	27	10 NM	02	1013.5	27.2	27.7	6	13	11	15	19.5
HBLR	14	46.0 N	157.2 E	06	20	40	1 NM	10	1014.0	14.0	12.0	24	36	20	24	36
JLHO	14	48.3 N	157.6 E	06	23	M 37	.25 NM	53	1009.5	13.0	11.7	4	6.5	23	6	10
NMMJ	14	55.9 N	172.5 W	06	29	M 38	5 NM	01	1010.0	8.2	6.6	3	11.5			
DZJF	14	19.7 N	177.8 E	12	09	28	5 NM	03	1018.2	28.2	30.0	6	21	09	9	19.5
9VVT	15	31.9 N	126.5 E	00	14	M 11	10 NM	02	1013.8	26.0		2	1.5	15	2	19.5
SGIB	15	03.8 N	89.6 W	00	16	M 35	10 NM									
ZTLV	15	25.4 N	121.7 E	00	12	40	5 NM		1004.0	26.5	27.0	3	5	12	8	11.5
VRLE	15	26.3 N	121.8 E	03	10	50	5 NM									
JMKU	15	47.5 N	161.4 E	06	19	M 39	2 NM	28	1018.0	13.0	11.4	3	5	19	5	6.5
SMOJ	15	50.5 N	164.9 E	12	22	M 35	1 NM	58	1015.0	10.0	12.0	5	5	22	5	6.5
GUZP	15	26.4 N	121.4 E	12	13	35	10 NM		1005.4	27.0		4	6.5			
EUEM	15	44.1 N	146.4 E	18	01	M 58	50 YD		1017.9		11.0					
JOUL	15	38.9 N	135.1 E	18	14	M 35	.5 NM	63	1001.0	24.0				14	5	18
PCEU	15	15.7 N	133.0 E	18	08	70	10 NM		1007.3	28.2	28.8					
VPLK	16	45.2 N	155.5 E	06	12	M 15	10 NM	01	1016.2	18.6	15.3	3	6.5	13	8	19.5
7JSO	17	36.2 N	124.3 W	18	31	36	10 NM		1020.0	19.0	14.9	4	13	35	11	8
D7SC	18	53.1 N	177.5 E	00	21	M 56	10 NM	03	1012.6	13.5	10.0	8	11.5			
SMCB	20	50.0 N	154.2 W	00	08	36	.25 NM	62	1014.0	14.0	12.0	5	13	08	8	16.5
JBMH	20	11.8 N	144.0 E	00	17	M 29	2 NM	21	1001.0	27.0	29.5	6	11.5	19	8	23
JPJX	20	10.9 N	146.7 E	00	20	26	10 NM	00	1012.2	28.0		3	5	22	3	19.5
C62932	21	50.3 N	128.2 W	06	01	35			1025.9		12.0					
JODP	21	18.6 N	141.5 E	09	13	M 25	10 NM	21	1006.7	29.0	29.5	5	8	16	11	26
D5BK	21	37.8 N	170.2 W	12	22	M 39	2 NM	45	1035.0	22.0	23.0	7	13	27	9	13
GRXS	21	17.3 N	142.1 E	18	14	M 37	5 NM	50	1004.3	27.0	29.0	6	11.5	15	8	13
GWED	21	18.1 N	136.5 E	18	08	M 42	5 NM		0997.5	28.5		5	8	28	7	11.5
JPSF	21	40.0 N	163.2 W	18	20	M 38	5 NM	07	1005.5	23.5	21.0	4	10	27	7	6.5
LKFL	21	51.2 N	167.7 W	18	05	M 35	2 NM	50	1003.0	11.0						
GWED	22	17.3 N	137.1 E	00	08	M 60		65		26.4		6	14.5	08	9	19.5

Nationality	Date	Position of Ship Lat. deg.	Position of Ship Long. deg.	Time GMT	Wind Dir. 10°	Wind Speed kt.	Visibility n. mi.	Present Weather code	Pressure mb.	Temperature °C Air	Temperature °C Sea	Sea Waves† Period sec.	Sea Waves† Height ft.	Swell Waves Dir. 10°	Swell Waves Period sec.*	Swell Waves Height ft.
PACIFIC	AUG.															
JODP	22	17.0 N	143.5 E	00	18	M 19	10 NM	15	1009.2	26.0	29.5	6	8	24	13	26
UHQS	22	16.0 N	137.9 E	00	14	M 64	200 YD	81		25.2	27.9	20	39			
JPJX	22	19.7 N	139.9 E	06	15	31	2 NM	62	1008.0	27.5	29.0	5	6.5	18	9	19.5
JXQH	22	50.2 N	162.0 W	12	15	M 40	50 YD	62	0996.0	12.0	9.0	6	10	15	5	8
WLGF	22	12.3 N	140.8 E	12	20	35	5 NM	60	1008.2	27.8	26.7	4	8	18	5	13
LKFL	22	52.0 N	159.6 W	18	20	M 35	5 NM	02	1005.0	11.0						
KPXT	23	53.9 N	159.2 W	00	19	M 45	2 NM		1008.0	11.8	11.7	6	8	19	0	36
JFTY	23	19.7 N	141.9 E	03	13	30	5 NM		1007.1	28.0	31.5	6	11.5	24	12	19.5
JLMN	23	20.7 N	137.5 E	03	13	M 50	1 NM	65	0996.0	28.0	30.0	8	32.5	11	10	16.5
KCKB	23	21.0 N	152.9 E	06	09	25	5 NM	16	1015.5	24.4		2	3	09	10	19.5
NMMJ	23	54.4 N	165.2 W	06	15	M 35	5 NM	51	0996.3	10.2	7.8	1	5			
TJKY	23	17.2 N	133.9 E	12	23	M 38	5 NM	02	1002.5	28.0	31.0	5	13			
7JGI	23	23.1 N	139.8 E	12	13	35	2 NM		1006.8	27.5	29.5					
BKRN	23	22.9 N	139.0 E	12	14	M 35	5 NM	02	1007.5	27.0	29.0	6	10	20	9	16.5
JMZR	23	45.0 N	153.7 E	12	29	M 37			1009.0	14.0	13.0	10	11.5			
JPJX	23	24.6 N	135.8 E	12	09	M 40	2 NM	21	1006.0	28.0	27.0	4	8			
KSPY	23	49.5 N	130.9 W	12	35	35	2 NM	02	1024.0	18.5	14.0	3	5	35	5	6.5
UGWX	23	51.1 N	158.1 E	12	33	35	.5 NM		0997.2	12.0						
WLGF	23	12.2 N	134.9 E	12	22	35	5 NM	13	1007.4	28.3	27.8	3	6.5	21	5	14.5
6KVL	23	52.7 N	154.0 W	18	18	M 43	50 YD	45	1022.5	11.5	9.0	6	8			
EUUG	23	52.0 N	159.2 E	18	35	39	5 NM	20	0996.6	10.0	12.0	6	5	12	9	10
EUUG	24	53.0 N	160.5 E	00	35	39	5 NM	28		10.0						
JAGX	24	25.7 N	139.4 E	00	12	30	5 NM		1010.0	29.0	27.0	8	10	20	13	19.5
JFJA	24	28.6 N	140.1 E	00	13	28	10 NM		1011.5	29.5	26.5	5	6.5	19	10	23
WLGF	24	12.5 N	131.8 E	00	18	35	5 NM	25	1007.0	26.7	27.8	4	11.5	20	8	10
7JKY	24	19.4 N	135.0 E	03	21	M 36	5 NM	02	1004.5	31.0	30.5	5	13	20	10	16.5
7JGI	24	20.7 N	141.7 E	03	14	22	5 NM		1009.8	30.0	29.5	6	14.5	27	8	19.5
JBIZ	24	09.0 N	127.1 E	03	18	M 30	10 NM	02	1006.5	30.0	28.0	6	6.5	18	11	19.5
DOUT	24	24.9 N	126.5 E	06	02	34	10 NM		1000.2	29.2	29.0	6	8	11	14	19.5
JPJX	24	27.3 N	132.8 E	06	09	M 40	5 NM	21	1003.5	29.5	28.0	4	10	16	15	23
JBYH	24	25.6 N	127.8 E	09	03	M 36			0999.0	29.5	28.0	5	10	13	12	26
DHEC	24	28.0 N	130.9 E	12	08	M 44	5 NM	25	1000.0	28.5	28.5	6	18	12	12	26
JBYG	24	25.4 N	127.2 E	12	02	M 36			0999.0	28.5	28.0	7	13	09	12	26
JOYJ	24	28.5 N	133.5 E	12	09	34	1 NM		1007.1	27.5	28.0	10	13	16	14	19.5
JKWP	24	27.5 N	129.4 E	15	06	M 35	5 NM	07	0998.5	28.0	28.5	5	8	15	7	23
SMKM	24	46.0 N	165.0 E	18	31	M 36	5 NM	02	1007.7	13.5	14.0	8	10	32	14	10
KGJB	24	28.4 N	127.6 E	18	06	M 29	10 NM	01		27.5	31.0	4	16.5	13	2	19.5
KGJX	24	47.3 N	178.1 W	18	15	M 38	.5 NM		1003.8	12.8	11.1	2	5	16	6	13
UWFT	24	44.6 N	146.7 E	18	20	60	5 NM		1014.6	15.0						
VRLE	24	28.6 N	127.1 E	18	05	M 50	10 NM	01	1001.9	28.3	25.1					
DEEF	25	26.7 N	137.4 E	00	16	M 26	10 NM	01	1007.8	27.5	27.1	4	3	21	13	19.5
JOYJ	25	28.5 N	134.7 E	00	09	39	5 NM		1005.3	27.0	28.0	8	16.5	09	15	16.5
JKWP	25	25.9 N	127.9 E	00	01	M 36	2 NM	07	0994.7	28.5	28.0	5	8	07	9	23
KGJX	25	48.1 N	175.0 W	00	15	M 39	.5 NM		1005.3	12.8	11.1	4	8	16	6	13
DHEC	25	31.5 N	135.1 E	03	09	33	10 NM		1009.0	27.5	27.0	6	13	17	13	29.5
GUMC	25	18.1 N	120.2 E	03	05	M 36	1 NM	18		26.0						
SMKM	25	46.9 N	169.0 E	06	31	M 35	5 NM	02	1004.7	11.0	12.0	8	10	32	14	10
DOUT	25	26.1 N	128.3 E	06	05	M 55	2 NM	81	0986.5	26.0	28.0	10	19.5	07	15	23
H3SY	25	47.9 N	168.4 E	06	33	M 33	2 NM	12	1004.0	12.0	8.0	10	19.5	31	9	16.5
JBYH	25	24.1 N	127.5 E	06	27	M 34	5 NM	02	0996.3	30.5	28.5	4	10	07	11	19.5
JCBR	25	34.6 N	144.3 E	06	14	15	10 NM		1017.5	31.0	27.5	2	3	21	10	19.5
JKMF	25	23.5 N	137.7 E	06	16	M 20	10 NM	02	1011.5	28.0	26.0	7	6.5	23	10	20
7JKY	25	25.3 N	134.7 E	09	17	M 41	5 NM	02	1003.5	28.0	29.0	6	14.5	18	14	21
ATAM	25	29.1 N	127.9 E	12	03	M 46	.25 NM	18	0994.0	27.0						
JBAA	25	24.0 N	130.0 E	12	25	M 35	5 NM	01	0998.5	29.0						
WTST	25	33.5 N	136.1 E	12	14	M 17	10 NM	02	1012.0	26.7	27.7	5	1.5	19	XX	24.5
PHWF	25	30.2 N	126.6 E	15	01	M 30	5 NM		0998.4	28.0	27.4	6	10	12	10	19.5
WGKF	25	29.3 N	133.7 E	18	12	M 40	5 NM	15	0997.0	25.0	27.0					
HPWV	26	26.8 N	123.5 E	00	02	75	5 NM		1002.0	25.5	27.5	5	6.5	35	6	8
PEDI	26	25.1 N	130.2 E	00	23	37	2 NM			27.0						
S6FH	26	29.0 N	133.8 E	00	16	M 11	2 NM	07	0995.2	27.8	31.0	15	23	19	12	24.5
WDZW	26	28.3 N	130.8 E	00	25	M 62	1 NM	60	0985.0	27.1	27.7	12	16.5	35	12	16.5
WSKJ	26	21.4 N	131.8 E	00	20	M 24	5 NM		1008.0	29.0	27.8	2	3	33	10	19.5
GEES	26	19.6 N	121.1 E	03	08	M 50	2 NM	63	1001.0	24.0						
JOYJ	26	28.5 N	135.2 E	03	17	M 41	2 NM	21	1004.1	27.9	27.5	10	16.5	18	12	16.5
DOUT	26	27.4 N	129.4 E	06	27	M 44	5 NM	81	0989.0	28.2	28.0	10	19.5	XX	8	19.5
H9MI	26	33.2 N	133.5 E	06	12	M 44	2 NM	18	0998.0	30.0	27.0	8	19.5	12	6	24.5
JJRG	26	32.8 N	123.2 E	06	33	15	10 NM		1002.5	26.3	26.0	4	3	11	9	23
7JKY	26	30.8 N	134.8 E	12	16	M 56	200 YD	63	1001.5	26.0	30.0					
JBVX	26	29.9 N	136.5 E	12	16	M 35			1002.2	27.2	29.0					
JLIW	26	28.4 N	134.7 E	12	18	M 45	2 NM	61	0999.0	27.0	28.0					
EREB	26	29.5 N	135.0 E	18	19	M 39	5 NM	25	0999.3	26.9	26.9					
GTHU	26	32.7 N	135.5 E	18	16	M 41	5 NM		0998.2	25.2	26.5	5	5	17	11	19.5
PHWF	26	29.7 N	128.5 E	18	20	M 42	5 NM	25	0992.0	27.2	28.0	7	11.5	07	9	14.5
D7SC	27	36.5 N	130.5 E	00	06	M 35	2 NM	58	0990.2	24.5	26.0	9	6.5			
DOUT	27	30.2 N	131.9 E	00	24	37	2 NM		0994.5	27.0	27.3	7	13	19	10	11.5
EREB	27	30.0 N	135.0 E	00	20	M 33	5 NM	15	1000.6	27.7	26.6	8	14.5	23	11	19.5
GTHU	27	32.6 N	135.9 E	00	18	M 42	2 NM	15	0999.9	28.2	23.5	6	10	21	13	21
UTFY	27	40.4 N	125.4 W	00	15	M 70										
WDZW	27	32.7 N	134.9 E	00	16	M 50	2 NM	05	1000.3	28.2	27.2	12	10	16	12	16.5
JIFS	27	32.0 N	136.4 E	03	17	M 38			1003.4	29.0	27.0	7	11.5	21	8	13

Nationality	Date	Position of Ship Lat. deg.	Position of Ship Long. deg.	Time GMT	Wind Dir. 10°	Wind Speed kt.	Visibility n. mi.	Present Weather code	Pressure mb.	Temperature °C Air	Temperature °C Sea	Sea Waves+ Period sec.	Sea Waves+ Height ft.	Swell Waves Dir. 10°	Swell Waves Period sec.*	Swell Waves Height ft.
PACIFIC	AUG.															
JLIW	27	26.3 N	132.0 E	06	21	15			1004.0	29.0	26.0	4	13	36	8	19.5
VLAP	27	34.3 N	137.0 E	06	15	M 37	5 NM	51	1002.0	26.0		5	11.5	15	8	19.5
WGKF	27	27.7 N	127.3 E	06	25	M 20	5 NM	02	1001.3	28.0	27.0	2	6.5	02	10	23
WTST	27	32.1 N	135.2 E	06	20	M 41	5 NM	02	0998.2	27.8	27.8	8	14.5	18	11	24.5
BPFT	27	37.8 N	122.2 E	12	02	43										
JJIP	27	27.6 N	118.6 W	18	33	M 05	10 NM	02	1015.5	21.9	20.5	4	1.5	05	20	21
BPEP	28	34.3 N	121.6 E	00	02	74										
ESIJ	28	43.0 N	132.2 E	00	14	M 47	2 NM	25	0986.3	20.9		4	3			
UIWK	29	48.1 N	149.3 E	00	19	35	10 NM									
ELZP	29	39.7 N	159.2 E	06	04	M 37	10 NM	02	1020.0	21.0						
UJTT	29	42.3 N	144.5 E	06	14	M 35	10 NM		1013.1	21.7	22.0	6	10			
DSZE	29	04.2 N	91.7 W	18	10	M 80										
UPIA	29	44.2 N	145.8 E	18	15	35	2 NM		1016.7	21.0	19.0	8	6.5			
DSHC	30	50.3 N	162.0 W	00	22	M 10			1018.0	12.0	13.0	4	1.5	21	14	32.5
UHQS	30	23.4 N	131.9 E	00	23	M 45	5 NM	15	0997.0		28.1	8	18			
GPUQ	30	34.8 N	155.0 E	06	09	M 32	10 NM	01	1015.9	23.5	24.0	6	13	08	8	19.5
UTRP	30	44.0 N	146.6 E	06	18	M 35	10 NM	10	1015.4	20.0	15.1	6	6.5			
URJI	31	42.5 N	145.1 E	00	28	M 45	5 NM		1021.7	21.6	20.0	5	6.5			
BLHO	31	47.2 N	156.0 W	05	22	M 35	50 YD		1016.5	15.5	13.0	4	5			
GPUQ	31	31.9 N	156.7 E	06	09	M 27	10 NM	01	1013.3	25.3	26.4	5	11.5	09	7	19.5
WEZM	31	44.7 N	163.0 W	06	21	M 42	1 NM	63	1010.8	17.2	12.2	2	8	20	7	8
3EED	31	44.5 N	160.2 W	18	21	M 40	2 NM	10	1010.0	18.5	16.0	4	5	20	10	13
NNGB	31	52.3 N	159.4 E	18	21	M 42	2 NM		1010.4	11.1	10.0					
	SEP.															
DHEC	1	32.4 N	133.0 E	09	09	11	10 NM		1010.5	27.5	27.0	2	1.5	11	14	26
DGWZ	3	38.8 N	141.0 E	06	25	M 44			1012.0	11.5	13.5	11	24.5			
GPUQ	3	34.6 N	141.1 E	06	11	M 09	10 NM	15	1004.8	28.8	29.1	2	1.5	19	10	29.5
ABWR	4	36.0 N	142.1 E	00	10	M 40			1007.0	20.0	26.0	32	24.5	10	30	23
JETI	4	32.1 N	143.5 E	03	13	M 70	50 YD	82		25.0	28.0	10	14.5	12	11	16.5
JIFS	4	30.7 N	143.8 E	06	21	M 68	.25 NM	21		26.0	26.0	9	16.5	20	10	23
JKXM	4	34.9 N	142.1 E	09	03	M 52			0998.0	22.0	28.0	7	13	06	8	16.5
JFYN	4	30.1 N	145.2 E	12	24	M 50			1000.6	26.0	26.3	6	24.5	23	14	24.5
SLHX	5	32.5 N	149.5 E	01	21	M 45	2 NM	96	1005.0	27.0	27.0	15	24.5	24	15	24.5
GCGS	5	35.1 N	151.8 E	06	20	M 36			1001.6	27.0	26.4	3	14.5	22	10	32.5
WEZO	5	36.7 N	154.8 E	12	17	M 40	10 NM	03	1007.5	25.6	24.4	3	11.5	16	7	28
GTHU	5	46.1 N	162.6 W	18	27	M 20	2 NM	28		13.2	13.3	5	5	34	10	24.5
BPLJ	6	35.9 N	122.7 E	00	02	78										
WEZO	6	36.3 N	151.9 E	00	25	M 32	10 NM	02	1007.0	23.9	23.9	3	11.5	25	8	28
BPLK	6	39.2 N	120.2 E	06	02	54										
PLYA	6	12.2 N	143.3 E	09	23	M 65	200 YD	99	0998.5	25.0	26.0	10	21	22	14	36
JDLC	6	44.5 N	151.3 E	12	36	M 53	.25 NM	63	0999.0	10.5	11.0	6	16.5			
D7PT	6	46.[illegible] N	162.0 W	18	07	M 54	5 NM	01	1012.0	12.0	12.5	6	8	27	7	8
3FHK	7	53.2 N	150.3 W	00	26	M 30	5 NM	02	0993.8	12.6	15.0	8	24.5	36	8	24.5
JPGO	7	56.1 N	166.3 W	00	31	M 35	5 NM	02	0995.9	8.0	9.6	3	8	32	7	26
JOEF	7	49.5 N	157.1 E	00	04	M 45	.25 NM	61	0995.5	11.0	11.5	4	6.5	09	12	26
PLYA	7	11.4 N	142.1 E	00	23	M 47	.5 NM	96	1004.5	27.0	26.0	11	19.5	23	9	32.5
DLDE	7	50.9 N	159.1 E	06	05	M 52	2 NM	62	1001.0	10.3	11.5	7	10	07	8	11.5
EVRW	7	47.8 N	153.4 E	06	34	M 48	2 NM	61	1004.9	8.0	4.0	10	19.5			
NFKO	7	17.4 N	140.6 E	12	08	50	2 NM	25	0998.0	27.2	29.4	5	10	09	7	19.5
SHCB	8	53.4 N	169.4 E	00	05	M 50	1 NM		1006.5	9.5	10.0	1	8	09	6	13
BKUY	8	47.3 N	168.7 E	00	22	M 37	1 NM	30	0998.5		13.0	9	16.5	21	11	24.5
DZPK	8	13.0 N	124.9 E	00	26	M 76	2 NM	81	1004.4	26.0	30.0					
JLMV	9	21.1 N	132.5 E	03	30	50	200 YD	65	0993.0	26.0	29.0	9	13	30	9	14.5
NRPO	9	47.3 N	124.5 W	06	11	60	5 NM			16.3						
BPRK	10	38.1 N	121.5 E	06	02	54										
PHPO	10	17.4 N	164.4 W	12	01	75	10 NM		1014.0	27.0						
SKVL	11	27.6 N	136.2 E	00	09	M 60	50 YD	07		21.0	27.0	6	14.5	13	7	16.5
ERCD	11	44.0 N	146.7 E	00	22	08	10 NM		1007.2	18.2	17.3	3	1.5	08	6	32.5
BPJF	11	38.0 N	120.9 E	06	02	48										
HOTM	11	36.1 N	166.4 W	06	18	48	5 NM	03	1016.0	23.0	22.5	7	6.5	18	7	6.5
KPGO	11	27.0 N	131.1 E	12	33	33	5 NM	03	1000.1	24.4	26.6	7	14.5	33	10	32.5
BPFT	12	35.6 N	122.7 E	00	02	74										
KIRF	12	36.5 N	125.6 W	00	36	50	10 NM	03	1016.3	17.7	15.5	5	8	34	9	11.5
KPGO	12	28.4 N	132.4 E	00	33	40	5 NM	02	1000.5	25.0	27.2	8	24.5	33	10	32.5
GCFA	12	32.4 N	134.5 E	03	01	M 60	2 NM	61	0990.6	24.0	28.0	10	23	03	12	26
BPNN	12	40.0 N	121.5 E	06	02	58										
BPJD	12	33.2 N	122.6 E	12	02	78	5 NM		1015.0							
BPJF	12	31.9 N	122.4 E	12	02	72										
BPKD	12	36.6 N	122.8 E	12	02	58										
BPKT	12	35.5 N	122.7 E	12	02	78										
OWIK	12	48.0 N	169.4 W	19	33	45	5 NM	81	0997.0	10.0	13.0	8	19.5	36	9	24.5
UUPA	13	46.9 N	152.2 E	00	10	M 72	5 NM	51	1020.1	12.3	10.2			12	4	1.5
JGQL	13	27.2 N	136.4 E	03	05	M 05	> 25 NM	02	1009.5	28.0	26.0	2	3	34	8	24.5
WTST	13	42.7 N	176.5 E	06	02	M 49	5 NM	15	1008.3	13.4	17.2	8	13	01	10	16.5
UYUG	13	43.9 N	146.6 E	12	29	M 48	5 NM	01	0997.5	17.0	12.0					
3EKN	13	39.1 N	175.5 W	18	34	M 49	5 NM	02	1007.0	13.5	19.0	6	6.5	33	10	14.5
DGZV	13	36.1 N	141.3 W	18	01	M 71	10 NM									
3EED	14	54.0 N	157.8 W	00	25	M 32	5 NM	03	1006.0	11.0	12.0	6	6.5	24	14	26
JPFM	14	44.2 N	171.1 W	00	02	M 48	.25 NM	22	0991.5	12.0		5	11.5	04	6	11.5

Nationality	Date	Position of Ship Lat. deg.	Position of Ship Long. deg.	Time GMT	Wind Dir. 10°	Wind Speed kt.	Visibility n. mi.	Present Weather code	Pressure mb.	Temperature °C Air	Temperature °C Sea	Sea Waves+ Period sec.	Sea Waves+ Height ft.	Swell Waves Dir. 10°	Swell Waves Period sec.*	Swell Waves Height ft.
PACIFIC	SEP.															
JJAD	14	42.1 N	149.8 E	00	23	14	10 NM		1015.5	16.5	14.0	4	6.5	22	8	24.5
UGRS	14	49.5 N	150.6 E	06	22	M 48	.25 NM	45		8.1	11.0	5	18			
WEZM	14	37.8 N	160.3 W	06	19	M 52	2 NM	25	1002.8	21.1	20.6	6	10	19	7	13
WTST	14	41.3 N	174.3 W	06	36	M 40	5 NM	15	1009.8	12.2	16.2	8	13	34	12	26
JCLL	15	46.2 N	158.6 E	00	29	29	5 NM	01	1005.5	11.5	12.0	6	10	28	12	24.5
JPVO	15	46.5 N	157.0 E	00	30	M 40	1 NM		1007.0	9.5	10.0	8	24.5	27	10	24.5
LEVT	15	41.4 N	155.1 W	00	21	M 55	1 NM	63	1006.8		19.0	8	16.5			
BPRJ	15	36.3 N	122.7 E	06	02	74										
WTST	15	40.1 N	164.7 W	06	31	M 36	10 NM	02	1014.2	14.4	19.4	9	13	33	11	24.5
LIQZ	15	45.2 N	166.3 E	12	32	M 40			1014.5	12.0		12	26			
OWIK	15	44.6 N	164.0 E	12	31	58	5 NM	02	1012.0	13.2		13	32.5	30	15	34.5
KAAV	15	42.6 N	169.9 E	18	30	35	10 NM		1010.1	13.9	16.1	6	8	30	12	28
3FMV	16	51.6 N	166.1 E	00	33	M 20	10 NM	03	1020.0	10.0	12.0	12	14.5	33	9	24.5
KAAV	16	43.3 N	175.1 E	06	34	35	10 NM	01	1016.0	14.0	12.8	7	8	29	15	24.5
BPKT	16	38.0 N	122.3 E	12	02	62										
3EOU	16	52.7 N	158.6 W	18	13	M 35	200 YD	82	0999.0	11.0	11.0	7	21	14	10	24.5
6ZAS	16	43.3 N	175.9 W	18	31	M 50	10 NM	01	1013.5	9.0	9.0	4	13	25	7	13
6ZAS	17	43.4 N	174.4 W	00	31	M 50	5 NM	02	1015.5	16.0	9.0	4	13	18	7	13
JKFS	17	39.2 N	170.9 W	00	30	M 30	10 NM	01	1015.5	15.0	18.0	5	13	29	9	24.5
KAAV	17	44.1 N	176.9 W	00	31	30	10 NM	01	1016.6	17.8	12.2	6	8	34	12	24.5
9MUT	17	43.8 N	167.9 W	06	28	M 48	10 NM	03	1004.0	10.0	8.0	8	16.5			
JRIO	17	54.0 N	162.3 W	18	15	21	5 NM		0987.5	9.0	11.0	3	5	18	10	26
3EOU	18	53.6 N	151.7 W	00	12	M 30	< 50 YD	44	1001.0	12.0	11.0	7	19.5	14	12	28
ENAP	18	54.0 N	153.5 W	18	14	48	10 NM		0998.9	13.6	11.0	7	8	21	10	13
GYYA	18	35.6 N	162.1 W	18	35	M 09	10 NM	02	1023.0	18.2	21.2	2	3	31	6	26
BPFT	19	39.0 N	120.4 E	12	02	50										
BPJF	19	38.1 N	120.5 E	12	02	62										
UMWI	19	51.2 N	135.3 W	18	01	72	10 NM		1014.2		15.2			29	6	5
BPFT	20	37.3 N	122.7 E	00	02	56										
BPJF	20	36.9 N	122.7 E	00	02	52										
GSAH	20	20.4 N	125.5 E	18	18	M 64	.5 NM	65		25.5	30.0	6	23	XX	8	19.5
GSAH	21	21.3 N	126.3 E	00	14	M 64	.5 NM	65	0991.1	26.5	30.0	6	23	XX	8	23
KPGO	21	44.5 N	164.5 W	00	29	20	10 NM	01	1002.0	10.5	12.5	6	19.5	27	8	26
JNTM	21	57.5 N	166.6 W	12	29	49	2 NM									
UYKE	21	44.8 N	159.8 E	18	18	M 50	1 NM	60	0995.7	12.3	12.8	10	14.5	17	12	13
WGWB	22	14.5 N	95.5 W	06	20	M 50	50 YD	82	1008.0	26.4	30.0					
ZCKU	22	39.9 N	146.9 E	06	30	38	5 NM	01	1005.8	19.0	18.5	6	16.5	27	10	32.5
JODP	22	26.6 N	133.2 E	09	12	M 12	10 NM	03	1007.2	27.0	27.0	3	5	23	14	29.5
9VAO	22	23.9 N	126.0 E	12	06	M 60	.25 NM	65		24.5	28.0					
ULZM	22	57.5 N	150.0 E	18	30	M 78	10 NM	02	1004.9	8.6	9.5					
UYKE	22	44.8 N	167.0 E	18	22	M 23	5 NM		0998.7	13.2	14.8	6	5	18	12	42.5
GOES	23	22.8 N	128.5 E	00	21	M 60	2 NM	62	0993.0	26.0						
3FSG	23	47.5 N	168.1 E	06	27	M 36	5 NM	02	0996.8	11.1	10.1	9	18	27	16	26
EWYC	23	55.5 N	163.0 E	06	03	M 48	5 NM	61	0985.3	9.5	9.2	8	11.5			
JBUY	23	46.7 N	170.0 E	06	23	M 40	.5 NM		0995.5	12.0	11.0	4	16.5	07	7	32.5
KHLQ	23	25.0 N	113.7 W	06	14	15	5 NM	01	1010.2	27.8	21.1	5	5	17	11	24.5
WDZW	23	28.2 N	130.2 E	22	06	M 54	1 NM	63		25.5	27.8	16	19.5	16	12	16.5
YCTC	24	09.0 N	85.0 W	00	21	01	10 NM	02	1007.0	28.5	29.0	2	3	21	21	34.5
BOTT	24	37.6 N	123.9 E	06	02	54										
BPGB	24	35.2 N	121.1 E	06	02	58										
UEMD	24	44.5 N	147.2 E	12	01	50			1021.0		12.8					
WDZW	24	29.6 N	128.2 E	12	34	M 48	10 NM	01	1006.5	25.0	26.5	7	8			
KRDH	24	53.2 N	174.9 E	18	27	28	5 NM	25	0993.6	6.7	8.3	4	11.5	31	10	24.5
ATQP	25	34.2 N	130.2 E	00	35	45			1000.8	20.5	25.0	8	16.5	34	10	24.5
ONMN	25	34.3 N	130.0 E	00	34	M 38	.5 NM	64	1001.2	20.0		5	13	03	8	26
BPFU	25	34.5 N	122.6 E	06	02	66										
BPJD	25	33.3 N	122.3 E	06	02	56										
BPRJ	25	35.6 N	122.7 E	06	02	70										
GZSH	25	33.1 N	142.0 E	06	14	M 19	5 NM	02	1012.8	27.0	26.2	2	5	27	12	24.5
BPGB	25	35.1 N	121.1 E	12	02	58										
EUEM	25	44.1 N	141.5 E	12	23	80										
DBON	25	37.3 N	145.0 E	23	35	M 23	10 NM	03	1014.0	23.5	23.0	1	10	35	9	26
BPFU	26	31.2 N	122.5 E	00	02	58										
BPGB	26	32.2 N	122.4 E	00	02	70										
BPRJ	26	31.9 N	122.5 E	00	02	66										
UWUC	26	10.7 N	86.5 W	00	25	39	10 NM		1009.9	27.0		22	55.5			
CGBS	26	50.9 N	142.2 W	12	19	M 18	2 NM	62	1016.1	12.1	11.8	5	3	18	10	54
JBUY	26	43.3 N	150.7 E	12	18	60	2 NM		1008.0	15.5	12.0	4	13	29	6	6.5
VPLE	27	24.2 N	120.3 E	18	03	M 48	10 NM	02	1013.8	25.0	28.0					
VPLE	28	25.5 N	121.2 E	00	05	M 58	10 NM	02	1017.7	25.7	25.6	3	6.5	06	6	8
KAAC	29	57.1 N	142.4 W	18	16	30	1 NM	63	1003.5	14.0	12.2	7	14.5	18	20	24.5
WSDX	29	45.9 N	126.0 W	18	33	M 13	10 NM	00	1019.0	20.0	14.6	4	1.5	33	8	32.5
JDLC	30	35.2 N	123.1 W	00	01	60	10 NM		1011.0		14.0	5	6.5	33	7	10
WSDX	30	46.9 N	128.1 W	06	33	M 15	10 NM	02	1020.0	15.0	14.5	3	1.5	33	6	32.5
ULZS	30	55.6 N	148.9 E	18	12	M 60	5 NM	51	0994.3	8.0	8.5			13	7	10

+ Direction for sea waves same as wind direction
X Direction or period of waves indeterminate
M Measured wind

NOTE: The observations are selected from those with winds ≥ 35 kn or waves ≥ 25 ft from May through August (≥ 41 kn or ≥ 33 ft, September through April).

U.S. Cooperative Ship Weather Reports

July, August and September 1982

TOTAL WEATHER REPORTS RECEIVED FROM US COOPERATIVE OBSERVING SHIPS JULY-SEPTEMBER 1982

SHIP	VIA RADIO	VIA MAIL	SHIP	VIA RADIO	VIA MAIL	SHIP	VIA RADIO	VIA MAIL	SHIP	VIA RADIO	VIA MAIL	SHIP	VIA RADIO	VIA MAIL	SHIP	VIA RADIO	VIA MAIL
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

SUMMARY: GRAND TOTAL VIA RADIO> 56483 GRAND TOTAL VIA MAIL> 131221

NOTE: The Grand Totals are cumulative from January 1, 1982. The 3-month totals are: Jan. Feb. Mar., Radio- 16807, Mail- 43023; April May June, Radio-20140, Mail- 44249; July Aug. Sep., Radio-19536, Mail- 43949.

U.S. NDBC Climatological Data

July, August and September 1982

JULY 1982			AIR TEMPERATURE (DEG C)							SEA TEMPERATURE (DEG C)							AIR-SEA TEMPERATURE DIFFERENCE (DEG C)						
BUOY	LAT	LONG	OBS	DAYS	MAX	DY HR	MIN	DY HR	MEAN	OBS	DAYS	MAX	DY HR	MIN	DY HR	MEAN	OBS	DAYS	MAX	DY HR	MIN	DY HR	MEAN
41002	32.3N	075.3W	742	31	30.6	26 15	23.9	03 10	27.2	743	31	30.6	26 19	25.7	01 10	27.8	743	31	01.7	26 15	-03.7	19 20	-00.5
41004	32.6N	078.7W	643	27	28.7	15 17	22.7	07 13	27.1	643	27	30.5	15 19	27.0	01 12	28.4	643	27	00.3	05 01	-05.1	19 15	-01.2
41006	29.3N	077.3W	743	31	29.3	22 21	23.6	27 13	27.9	743	31	30.5	02 21	27.5	08 09	28.7	743	31	00.2	04 14	-05.1	27 13	-00.7
42001	25.9N	089.7W	741	31	32.5	04 14	26.7	20 21	30.1	742	31	31.6	24 23	28.1	01 07	29.3	742	31	04.1	04 14	-03.9	03 22	00.8
42002	26.0N	093.5W	743	31	32.5	24 23	26.1	21 17	29.5	743	31	33.2	24 23	29.7	03 04	30.6	744	31	00.2	12 17	-04.1	21 17	-01.1
42003	26.0N	086.0W	466	20	31.4	02 22	26.0	17 09	29.0	466	20	33.3	08 21	29.1	17 09	30.7	466	20	-00.1	03 15	-03.5	19 02	-01.6
42007	30.1N	088.9W	626	27	30.9	02 00	27.1	25 12	28.3	629	27	32.2	03 19	28.1	08 07	29.7	629	27	01.5	07 01	-06.1	25 12	-01.4
42006	28.7N	095.3W	738	31	29.1	24 23	26.2	13 16	28.1	742	31	30.2	20 22	27.7	06 12	28.9	742	31	00.5	06 15	-03.0	23 17	-00.7
42011	29.6N	093.5W	201	09	29.6	01 21	27.2	08 13	28.8														
44003	40.8N	068.5W	739	31	20.0	29 00	11.2	05 05	15.2	739	31	17.4	11 22	10.5	01 02	12.3	739	31	07.0	21 09	-02.1	22 04	02.9
44004	39.0N	070.0W	733	31	26.4	20 22	18.1	05 01	23.1	733	31	26.7	17 19	20.5	07 07	24.2	734	31	01.1	04 03	-04.5	30 21	-01.1
44005	42.7N	068.3W	741	31	20.2	19 18	12.5	04 15	17.2														
44007	43.5N	070.1W	720	31	26.8	26 20	11.7	04 10	18.0	735	31	21.0	16 17	12.0	08 12	16.4	737	31	08.8	26 15	-02.2	13 14	01.6
45001	48.0N	087.6W	725	31	11.5	17 15	04.1	15 08	06.6	743	31	04.4	26 19	03.0	01 01	03.4	743	31	08.1	17 15	00.8	15 08	03.2
45002	45.3N	086.3W	722	31	21.3	28 23	05.7	02 11	14.6	744	31	19.2	27 22	03.6	01 02	12.4	744	31	08.7	06 02	-02.0	31 11	02.2
45003	45.3N	082.8W	726	31	19.2	18 23	05.3	01 10	12.6	740	31	17.9	29 20	03.1	01 02	09.5	743	31	09.9	08 02	-00.4	28 01	03.1
45004	47.2N	086.5W	728	31	13.2	06 11	03.9	31 09	06.9	743	31	03.8	27 16	02.7	01 00	03.2	743	31	10.4	06 11	00.4	31 09	03.8
45005	41.7N	082.5W	742	31	28.1	25 23	17.3	01 15	23.4	742	31	26.6	16 23	19.9	01 10	23.7	742	31	03.6	07 18	-03.8	20 09	-00.3
45006	47.3N	090.0W	707	31	17.9	31 23	04.5	04 12	09.6	742	31	13.9	31 22	03.7	05 01	06.7	744	31	10.1	06 05	-01.5	30 22	03.0
45007	42.7N	087.1W	740	31	22.2	26 04	10.3	01 03	17.7	734	31	21.0	29 22	07.4	01 11	15.7	740	31	06.8	06 00	-00.9	28 16	02.0
45008	44.3N	082.4W	731	31	20.7	18 07	08.6	01 10	16.1	742	31	20.8	21 22	06.9	03 09	14.5	742	31	07.2	07 15	-02.7	28 10	01.6
46001	56.0N	148.0W	742	31	12.1	31 18	07.2	02 13	09.5	743	31	12.5	31 23	08.0	03 11	09.8	743	31	00.5	08 19	-02.7	28 11	-00.3
46002	42.5N	130.0W	743	31	19.1	26 22	13.1	02 09	15.3	743	31	19.1	31 00	14.9	01 06	16.3	743	31	01.2	09 19	-02.8	27 00	-01.0
46003	52.0N	156.0W	741	31	10.7	22 13	05.4	01 16	08.0	742	31	10.1	31 23	07.1	04 13	08.4	742	31	01.6	22 13	-03.0	20 13	-00.4
46004	51.0N	136.0W	741	31	12.9	02 22	09.1	13 13	10.9	742	31	13.4	03 01	10.2	09 15	10.9	742	31	01.4	26 16	-01.7	04 05	00.0
46005	46.0N	131.0W	742	31	17.8	31 20	11.2	09 07	13.3	742	31	19.8	31 22	14.1	08 08	15.1	743	31	-00.2	31 17	-03.6	22 19	-01.9
46006	40.7N	137.7W								742	31	17.6	15 02	14.6	02 14	16.0							
46011	34.9N	120.9W	740	31	15.8	01 01	10.7	31 15	13.2	741	31	15.7	03 22	11.9	25 13	13.1	741	31	01.7	10 03	-02.6	31 15	00.1
46012	37.4N	122.7W	740	31	16.3	18 23	11.5	30 14	13.6	740	31	16.2	10 01	12.6	21 01	14.4	740	31	02.1	18 23	-02.6	21 14	-00.7
46013	38.2N	123.3W	744	31	16.9	18 22	10.1	17 12	12.4	744	31	13.6	19 00	09.7	16 15	11.0	744	31	05.2	18 20	-01.0	24 13	01.4
46014	39.2N	124.0W	742	31	15.6	22 00	09.1	19 17	13.3	744	31	16.3	20 23	10.4	31 17	12.7	744	31	02.4	15 00	-03.0	20 09	00.5
46017	60.3N	172.3W	185	24	09.1	29 21	02.8	20 23	05.8														
46019	57.2N	170.3W	246	31	13.3	12 03	04.6	30 12	07.3														
46020	55.9N	168.0W	170	23	09.3	10 03	04.3	27 12	06.6	173	23	08.9	10 03	06.1	01 09	07.1	175	23	01.0	09 03	-02.6	27 12	-00.5
46022	40.8N	124.5W	743	31	16.9	14 01	10.4	19 16	13.5	743	31	16.1	04 21	10.4	24 16	12.9	743	31	02.3	22 04	-02.2	18 20	00.6
46023	34.3N	120.7W	742	31	15.9	01 01	11.0	06 13	13.7	742	31	16.0	31 04	12.3	07 11	13.8	742	31	02.0	03 20	-02.9	31 07	-00.1
46024	33.0N	119.2W	741	31	18.2	22 19	13.3	12 11	15.1	740	31	18.8	30 22	15.8	08 09	16.8	742	31	00.8	22 19	-03.7	28 07	-01.7
46025	33.8N	119.3W	743	31	21.0	22 21	14.4	08 10	17.2	743	31	20.4	23 02	16.1	01 16	17.9	743	31	02.7	22 22	-03.1	13 13	-00.7
46026	37.8N	122.7W	200	09	12.6	26 03	10.0	28 16	11.4	200	09	13.6	23 20	10.7	31 05	12.3	200	09	01.3	31 23	-02.1	24 08	-00.9
51001	23.4N	162.3W	743	31	26.7	31 22	23.6	15 10	25.7	743	31	27.0	27 02	25.7	16 15	26.3	743	31	00.2	18 22	-02.4	06 12	-00.7

JULY 1982			PRESSURE (MB)							WIND SPEEDS (KNOTS)				MEAN WIND SPEED (KNOTS)								
BUOY	LAT	LONG	OBS	DAYS	MAX	DY HR	MIN	DY HR	MEAN	OBS	MAX	DY HR	DIR	N	NE	E	SE	S	SW	W	NW	TOTAL
41002	32.3N	075.3W	743	31	1024.0	07 17	1011.2	01 00	1019.5	700	22	29 05	210	5.2	8.8	5.4	7.0	10.2	11.6	10.5	4.3	09.9
41004	32.6N	078.7W	643	27	1022.7	16 16	1010.8	01 00	1018.2	628	23	23 19	220	4.9	8.4	7.2	5.9	7.6	10.4	8.8	5.1	08.5
41006	29.3N	077.3W	743	31	1024.7	31 05	1013.5	01 00	1019.0	735	19	06 22	130	6.2	9.1	8.3	6.9	9.1	8.9	8.3	4.9	08.4
42001	25.9N	089.7W	741	31	1021.7	02 16	1014.4	21 00	1017.5	698	21	15 05	130	5.1	5.4	6.1	6.4	5.7	3.6	2.9	4.3	05.9
42002	26.0N	093.5W	742	31	1020.9	02 15	1014.1	20 23	1016.9	718	19	30 22	200	3.1	4.0	6.2	7.3	6.0	3.5	3.0	7.4	06.5
42003	26.0N	086.0W	466	20	1021.6	02 16	1014.9	20 08	1017.9	425	13	10 14	120	3.6	5.3	6.1	7.1	3.9	2.9	3.0	3.4	05.1
42007	30.1N	088.9W	629	27	1021.8	02 17	1014.2	19 23	1017.6	619	30	07 01	030	6.2	6.2	6.8	6.1	6.6	7.1	7.6	6.4	06.7
42006	28.7N	095.3W	742	31	1020.2	02 15	1013.2	21 00	1016.0	737	19	24 14	210	4.2	8.5	9.4	11.0	10.8	8.9	6.6	5.1	10.4
42011	29.6N	093.5W	201	09	1020.8	02 17	1014.2	05 02	1017.1	731	16	06 07	200	6.3	5.8	5.2	7.1	8.4	9.0	7.0	6.6	08.2
44003	40.8N	068.5W	739	31	1026.0	06 13	1003.2	04 08	1015.7	720	21	28 21	120	7.5	4.6	4.9	6.0	7.3	7.4	7.2	6.2	06.9
44004	39.0N	070.0W	734	31	1025.5	06 15	1000.1	04 05	1016.7	726	24	04 06	250	10.4	8.3	7.6	6.0	6.9	11.0	10.6	8.1	09.6
44005	42.7N	068.3W	741	31	1023.7	06 13	1001.8	29 07	1014.4	742	27	28 23	160	12.2	11.7	6.7	8.8	10.5	13.0	10.3	10.3	11.4
44007	43.5N	070.1W	735	31	1023.4	14 15	1002.9	29 08	1014.5	722	20	07 19	210	9.6	4.7	6.7	6.9	9.2	10.6	8.1	8.7	09.3
45001	48.0N	087.6W	742	31	1025.5	23 15	997.5	07 12	1013.6	735	21	11 17	320	7.1	5.8	5.1	5.9	7.5	8.3	7.4	8.1	07.2
45002	45.3N	086.3W	744	31	1024.0	01 16	992.5	11 12	1014.6	724	22	18 05	200	6.0	4.7	5.4	5.2	7.1	9.6	7.9	6.3	07.4
45003	45.3N	082.8W	742	31	1022.5	01 15	998.4	11 13	1014.9	723	19	12 08	270	4.3	4.7	5.5	7.5	7.6	6.8	6.2	6.9	06.9
45004	47.2N	086.5W	743	31	1024.8	23 15	993.0	11 16	1013.9	722	24	11 21	330	5.9	5.3	5.9	6.2	8.1	7.7	7.5	7.7	07.0
45005	41.7N	082.5W	742	31	1022.8	01 18	1005.9	11 08	1015.8	701	19	11 11	260	9.1	7.7	7.5	6.3	6.0	8.4	8.6	7.3	07.6
45006	47.3N	090.0W	743	31	1024.7	23 15	998.4	07 08	1013.7	644	18	21 11	240	3.1	7.7	5.3	5.3	6.1	7.2	7.4	5.0	06.6
45007	42.7N	087.1W	742	31	1023.7	01 16	1000.1	11 05	1014.8	740	19	07 05	190	8.4	6.4	5.0	6.5	7.9	7.1	5.9	5.4	07.1
45008	44.3N	082.4W	742	31	1023.2	01 16	1000.9	11 11	1015.2	708	23	12 07	260	6.0	6.2	4.3	5.7	8.5	8.4	8.8	6.9	07.3
46001	56.0N	148.0W	741	31	1034.5	26 21	999.0	03 15	1016.7	738	24	03 06	140	9.2	12.1	11.5	15.9	10.4	12.5	11.9	8.3	12.0
46002	42.5N	130.0W	743	31	1030.2	22 17	1013.6	04 11	1021.3	727	20	04 07	200	14.1	8.9	4.9	4.7	8.9	9.6	7.7	9.3	10.4
46003	52.0N	156.0W	742	31	1032.9	31 18	988.8	07 01	1018.3	737	34	06 20	130	9.9	2.8	17.9	16.6	15.1	15.6	15.4	11.9	14.5
46004	51.0N	136.0W	741	31	1034.6	22 23	997.2	08 03	1019.0	736	28	05 13	140	16.1	6.5	9.3	18.0	16.1	10.5	12.6	13.3	14.3
46005	46.0N	131.0W	742	31	1032.5	22 17	1008.6	04 09	1020.1	735	25	04 06	170	7.4	3.3		8.1	11.8	9.8	9.6	13.7	11.7
46006	40.7N	137.7W	741	31	1034.7	23 07	1013.9	03 13	1023.5	739	26	07 20	220	14.0	13.4	12.8	6.4	9.1	11.5	11.3	11.8	12.0
46011	34.9N	120.9W	741	31	1019.0	28 16	1009.0	15 10	1014.5	738	26	02 02	290	3.7	2.6	3.3	2.9	3.5	5.4	13.4	11.5	11.9
46012	37.4N	122.7W	740	31	1020.6	28 17	1008.2	15 11	1016.0	727	19	19 01	340	11.8	2.0	1.0	1.6	3.6	2.6	5.1	10.5	10.2
46013	38.2N	123.3W	744	31	1021.4	03 19	1008.0	15 11	1016.1	702	29	16 04	310	9.3	3.5	9.0	8.4	6.3	3.6	6.9	17.3	16.2
46014	39.2N	124.0W	744	31	1022.0	03 18	1010.3	16 02	1016.7	737	33	16 02	320	10.9	4.1	4.9	5.3	7.0	3.5	3.7	16.2	16.2
46017	60.3N	172.3W	185	24	1024.3	19 21	1005.5	09 00	1013.9	183	20	11 12	160	8.9	7.8	7.8	11.7	12.2	9.8	7.3	7.3	09.1
46019	57.2N	170.3W	247	31	1029.0	31 00	988.5	02 18	1011.1	245	22	03 06	040	7.0	9.0	10.4	13.7	8.7	9.0	9.9	9.0	09.7
46020	55.9N	168.0W	066	09	1010.0	09 03	984.4	02 18	998.9	154	149	06 15	360	64.3								64.3
46022	40.8N	124.5W	743	31	1029.0	28 19	1011.4	17 13	1018.0	727	22	16 09	350	9.3	4.2	2.3	3.6	4.6	5.0	3.8	6.2	08.0
46023	34.3N	120.7W	742	31	1018.5	28 16	1009.0	15 10	1014.1	739	27	20 12	330	15.5						2.4	17.9	16.9
46024	33.0N	119.2W	740	31	1018.5	28 07	1009.0	15 02	1013.7	728	23	05 02	310	5.7			1.4	3.2	4.4	7.0	13.0	11.8
46025	33.8N	119.3W	743	31	1018.6	28 16	1009.1	15 03	1014.0	734	14	01 10	280	3.1	1.8	3.3	3.8	3.6	4.1	6.8	4.7	05.3
46026	37.8N	122.7W	200	09	1020.3	28 18	1012.7	24 03	1016.5	200	19	29 08	310	3.0				5.0	6.5	9.1	11.8	10.2
51001	23.4N	162.3W	743	31	1020.6	03 21	1010.3	21 04	1016.8	743	27	15 10	080		15.9	16.7						16.2

JULY 1982			WAVE HEIGHTS (METERS)				FREQUENCY OF WAVE HEIGHTS (%)							
BUOY	LAT	LONG	OBS	MAX	DY HR	MEAN	<1M	1-1.5M	2-2.5M	3-3.5M	4-5.5M	6-7.5M	8-9.5M	>9.5M
41002	32.3N	075.3W	740	2.5	29 14	0.9	37.8	58.7	3.3					
41004	32.6N	078.7W	641	1.5	04 02	0.8	39.1	60.8						
41006	29.3N	077.3W	741	2.0	24 15	1.0	12.9	84.6	2.4					
42001	25.9N	089.7W	738	1.0	15 05	0.2	97.2	2.7						
42002	26.0N	093.5W	727	1.5	01 00	0.5	82.6	17.3						
42003	26.0N	086.0W	464	1.0	14 10	0.3	98.4	1.5						
44003	40.8N	068.5W	738	2.5	21 23	0.9	35.6	58.2	6.0					
44004	39.0N	070.0W	719	3.5	04 06	0.9	41.8	48.2	8.0	1.8				
44005	42.7N	068.3W	736	2.5	29 01	0.8	51.2	44.7	4.0					
44007	43.5N	070.1W	726	2.0	29 01	0.5	86.3	13.2	0.4					
45001	48.0N	087.6W	740	2.0	07 18	0.4	83.5	15.5	0.9					
45002	45.3N	086.3W	735	2.5	11 17	0.4	74.1	23.9	1.9					
45003	45.3N	082.8W	731	2.5	12 09	0.3	86.0	12.0	1.9					
45004	47.2N	086.5W	731	3.5	11 22	0.2	92.3	6.0	0.9	0.6				
45005	41.7N	082.5W	737	1.5	28 01	0.4	78.9	21.0						
45006	47.3N	090.0W	730	1.5	07 14	0.3	89.0	10.9						
45007	42.7N	087.1W	737	1.5	07 06	0.4	84.5	15.4						
45008	44.3N	082.4W	732	2.5	12 07	0.4	80.6	16.9	2.4					
46001	56.0N	148.0W	739	4.0	03 07	1.8	0.9	43.8	48.9	5.6	0.5			
46002	42.5N	130.0W	741	3.5	07 13	1.6	6.7	57.6	31.0	4.5				
46003	52.0N	156.0W	739	7.0	07 20	1.8	3.9	50.8	31.1	10.1	2.9	0.9		
46004	51.0N	136.0W	741	4.5	06 16	1.9	6.2	44.5	30.6	17.0	1.6			
46005	46.0N	131.0W	742	4.0	07 03	1.6	8.7	53.0	31.1	6.1	0.8			
46006	40.7N	137.7W	740	3.5	07 23	1.4	12.1	55.1	27.9	4.7				
46011	34.9N	120.9W	728	3.0	30 04	1.6	1.0	64.1	34.3	0.4				
46012	37.4N	122.7W	732	3.0	15 06	1.6	5.6	50.5	41.8	2.0				
46013	38.2N	123.3W	741	3.5	15 00	1.8	4.8	36.0	52.4	6.6				
46014	39.2N	124.0W	742	3.5	15 01	1.8	0.1	43.1	45.9	10.7				
46022	40.8N	124.5W	737	4.5	16 07	1.8	1.0	60.7	21.1	14.6	2.3			
46023	34.3N	120.7W	739	3.5	11 14	1.9		35.5	54.9	9.4				
46024	33.0N	119.2W	721	2.5	11 07	1.4		79.0	20.9					
46026	37.8N	122.7W	200	2.0	29 07	1.3		82.5	17.5					
51001	23.4N	162.3W	742	3.0	02 16	2.1		19.5	70.0	10.3				

JULY 1982			TOTAL FREQUENCY OF WIND SPEEDS (%)							TOTAL FREQUENCY OF WIND DIRECTIONS (%)							
BUOY	LAT	LONG	CALM	<4KT	4-10KT	11-21KT	22-33KT	34-47KT	>47KT	N	NE	E	SE	S	SW	W	NW
41002	32.3N	075.3W		8.7	51.9	39.1	0.3			2.0	3.4	3.3	15.7	25.9	43.5	4.6	1.6
41004	32.6N	078.7W		9.2	61.8	28.8	0.2			2.5	5.1	13.3	9.3	12.4	35.6	17.7	4.2
41006	29.3N	077.3W		8.6	63.5	27.9				0.7	0.5	6.5	19.4	35.6	24.2	9.9	3.0
42001	25.9N	089.7W		25.4	65.8	8.9				2.0	16.2	36.2	31.5	11.0	1.4	0.5	1.0
42002	26.0N	093.5W		20.3	68.1	11.6				1.7	4.3	24.8	48.7	17.7	1.4	0.7	0.6
42003	26.0N	086.0W		35.1	61.2	3.8				6.0	9.3	31.8	19.0	9.7	10.4	7.2	6.6
42007	30.1N	088.9W		20.7	63.8	14.9	0.6			3.0	7.7	11.3	18.3	19.8	21.3	13.0	5.6
42008	28.7N	095.3W	0.3	4.2	44.5	51.3				1.6	0.1	1.1	19.1	65.1	10.6	1.0	1.5
42011	29.6N	093.5W	1.4	8.9	66.5	24.6				2.3	3.7	2.4	6.3	28.8	43.9	8.9	3.7
44003	40.8N	068.5W		11.1	76.1	12.6				8.4	5.8	7.4	4.8	18.7	39.7	11.0	4.2
44004	39.0N	070.0W		10.6	45.2	43.4	0.8			11.0	7.3	8.3	4.6	5.6	33.8	19.3	10.0
44005	42.7N	068.3W		4.6	43.7	47.7	4.0			8.3	2.9	1.8	6.0	20.2	38.8	15.7	6.4
44007	43.5N	070.1W		9.7	50.3	40.0				10.6	1.7	2.5	4.8	19.0	34.7	15.0	11.7
45001	48.0N	087.6W		14.1	69.9	15.9				6.5	8.1	7.7	11.9	17.2	24.6	15.5	8.7
45002	45.3N	086.3W		14.6	62.7	22.5	0.1			9.5	8.8	5.1	6.6	20.2	34.7	7.6	7.7
45003	45.3N	082.8W		16.7	66.7	16.5				2.7	2.4	3.5	9.4	28.9	15.1	16.3	21.7
45004	47.2N	086.5W		14.7	74.0	10.5	0.8			6.7	7.9	14.6	8.6	15.3	17.0	12.5	17.2
45005	41.7N	082.5W		13.4	67.3	19.3				4.9	13.9	12.6	13.2	12.4	22.4	15.7	5.0
45006	47.3N	090.0W		21.3	64.6	14.1				5.0	25.9	10.7	6.6	11.8	21.4	13.7	4.8
45007	42.7N	087.1W		16.1	67.6	16.4				15.0	6.4	3.5	15.9	27.2	16.9	8.8	6.4
45008	44.3N	082.4W		16.8	65.4	17.5	0.3			13.1	10.5	4.8	9.8	28.1	15.1	7.6	11.4
46001	56.0N	148.0W		1.6	32.7	65.0	0.7			5.4	13.9	4.2	7.4	6.3	30.3	29.5	3.3
46002	42.5N	130.0W		8.4	43.6	48.0				33.3	1.4	3.6	4.2	9.7	14.5	11.5	21.0
46003	52.0N	156.0W		2.8	19.9	68.8	8.3	0.1		9.1	0.3	1.1	13.7	25.3	21.5	14.8	14.1
46004	51.0N	136.0W		4.6	21.7	60.9	12.8			17.7	1.1	1.4	6.2	15.6	10.8	18.0	29.2
46005	46.0N	131.0W		7.5	32.2	57.1	3.1			2.4	0.3		2.4	11.7	17.5	19.5	46.1
46006	40.7N	137.7W		3.9	37.3	55.9	2.8			16.7	18.9	7.6	2.5	11.2	13.9	11.1	18.1
46011	34.9N	120.9W		6.5	32.4	58.4	2.7			1.6	1.8	2.2	0.6	0.7	1.2	49.2	43.5
46012	37.4N	122.7W		6.5	42.6	50.9				20.9	<.05	0.2	0.2	2.1	1.1	5.3	70.1
46013	38.2N	123.3W		3.3	14.1	60.0	22.6			2.8	1.5	0.5	0.7	0.6	0.5	4.0	89.5
46014	39.2N	124.0W		5.0	22.4	61.2	11.4			16.3	1.1	1.6	2.3	3.4	0.3	1.1	72.0
46017	60.3N	172.3W		6.6	59.6	33.9				13.8	11.5	10.7	8.6	10.4	24.6	20.0	1.1
46019	57.2N	170.3W		9.6	51.4	36.7	2.0			8.0	10.6	12.6	11.9	17.0	13.4	13.8	12.0
46020	55.9N	168.0W		4.5	5.2	10.4	9.1	11.7	59.1	0.0							
46022	40.8N	124.5W		15.8	56.8	27.2	0.1			71.8	5.0	1.0	1.7	5.6	3.4	4.1	7.4
46023	34.3N	120.7W		1.6	7.7	77.8	12.9			20.5						0.6	78.9
46024	33.0N	119.2W		5.4	32.7	60.4	1.5			2.5			0.2	0.7	1.9	12.1	82.6
46025	33.8N	119.3W		30.5	65.9	3.5				1.7	1.0	5.1	10.6	10.1	16.7	47.9	6.9
46026	37.8N	122.7W		2.0	48.0	50.0				0.5				0.8	10.6	33.6	54.5
51001	23.4N	162.3W			6.5	88.8	4.7				65.3	34.7					

JULY 1982			% FREQUENCY OF WIND SPEEDS (<4 KTS)								% FREQUENCY OF WIND SPEEDS (4-10 KTS)								% FREQUENCY OF WIND SPEEDS (11-21 KTS)							
BUOY	LAT	LONG	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW
41002	32.3N	075.3W	0.4	0.5	1.1	2.1	3.2	0.7		0.7	1.5	1.3	1.9	11.4	11.5	20.7	2.6	0.9	0.1	1.6	0.3	2.2	11.2	21.8	2.0	
41004	32.6N	078.7W	1.0	0.4	1.0	1.6	1.6	0.4	2.0	1.2	1.3	2.7	10.6	7.2	8.9	17.8	10.3	3.0	0.2	2.1	1.7	0.5	1.8	17.2	5.4	
41006	29.3N	077.3W	0.3	<.05	0.5	1.5	2.2	1.8	1.2	1.0	0.4	0.2	4.2	16.0	19.8	15.2	5.7	1.9	0.1	0.3	1.6	1.8	13.7	7.2	3.0	
42001	25.9N	089.7W	0.4	5.4	8.3	6.5	3.3	0.8	0.3	0.4	1.6	9.6	24.7	21.9	6.4	0.6	0.3	0.6		1.2	3.3	3.1	1.4			
42002	26.0N	093.5W	1.4	2.3	4.8	5.9	4.7	0.9	0.4		0.2	1.9	17.9	35.8	11.0	0.5	0.3	0.5	0.1	0.1	2.1	7.8	1.9	<.05		0.1
42003	26.0N	086.0W	3.8	2.6	6.4	2.3	4.3	7.2	4.2	4.2	2.2	6.5	24.5	14.1	5.4	3.2	3.0	2.4		0.2	0.9	2.6				
42007	30.1N	088.9W	0.8	1.7	3.0	3.8	4.1	3.1	2.7	1.5	1.8	5.4	6.6	13.3	13.5	13.5	6.5	3.2	0.4	0.5	1.3	1.2	2.2	4.7	3.6	0.9
42008	28.7N	095.3W	0.9			0.6	1.1	1.0	0.1	0.4	0.6	0.1	0.8	7.5	27.8	5.7	0.9	1.1			0.2	11.0	36.2	3.9		
42011	29.6N	093.5W	0.2	0.4	0.8	1.5	2.6	1.7	1.3	0.4	2.0	3.0	1.3	3.6	17.8	28.9	6.9	3.0	0.1	0.3	0.3	1.3	8.4	13.3	0.8	0.2
44003	40.8N	068.5W	0.8	1.7	1.5	0.6	1.1	3.2	1.4	0.9	6.1	4.1	5.8	3.9	15.9	29.8	7.5	3.1	1.6	<.05	0.1	0.3	1.7	6.7	2.1	0.2
44004	39.0N	070.0W	1.7	0.9	1.1	1.1	1.8	1.8	1.3	1.1	3.4	4.3	5.8	2.8	2.6	11.2	8.6	6.4	6.0	2.1	1.4	0.7	1.2	20.4	9.1	2.5
44005	42.7N	068.3W	0.7	<.05	0.1	0.5	0.7	0.9	1.3	0.3	3.2	1.6	1.7	4.6	11.5	11.7	6.2	3.2	2.9	0.9		0.3	7.5	25.3	8.1	2.7
44007	43.5N	070.1W	0.7	0.6	0.8	1.1	1.9	1.4	2.0	1.1	5.2	1.1	1.2	3.1	9.8	14.8	8.4	6.6	4.6		0.5	0.7	7.3	18.5	4.5	3.9
45001	48.0N	087.6W	0.9	1.9	1.9	2.3	2.2	2.6	1.5	1.0	4.5	5.9	5.8	8.9	11.9	14.8	11.9	6.3	1.0	0.3		0.7	3.1	7.3	2.1	1.4
45002	45.3N	086.3W	2.6	2.0	1.2	1.1	3.2	1.6	0.9	2.0	6.1	6.8	3.5	5.4	12.4	19.2	5.0	4.4	0.8		0.4	0.2	4.5	13.8	1.6	1.3
45003	45.3N	082.8W	1.5	0.8	0.4	0.9	2.8	2.4	4.5	3.4	1.1	1.7	3.0	7.4	20.3	10.9	9.6	14.8	0.1			1.2	5.8	1.8	2.1	3.5
45004	47.2N	086.5W	1.9	2.3	2.4	1.2	1.5	1.4	1.6	2.3	3.8	5.5	12.0	7.2	10.4	13.5	8.8	12.7	0.8	0.1	0.3	0.2	3.5	2.2	2.1	1.4
45005	41.7N	082.5W	0.6	2.0	1.1	1.3	3.0	3.0	1.5	0.9	2.1	9.2	10.5	11.8	8.6	11.9	9.9	3.4	2.2	2.7	1.0	0.1	0.8	7.5	4.3	0.7
45006	47.3N	090.0W	3.5	3.7	3.4	2.2	2.5	2.6	1.7	1.8	1.4	14.9	6.8	4.6	8.3	16.4	9.2	3.0	0.2	7.2	0.5		1.0	2.4	2.8	
45007	42.7N	087.1W	2.1	1.5	1.1	2.3	2.2	2.7	2.2	2.2	7.9	4.1	2.4	12.8	19.3	11.4	5.8	3.9	5.0	0.9		0.8	5.8	2.8	0.7	0.3
45008	44.3N	082.4W	2.4	1.9	1.8	2.1	2.6	1.9	2.1	2.0	10.1	8.6	2.6	7.0	18.2	8.4	3.0	7.5	0.6			0.7	7.3	4.7	2.3	1.9
46001	56.0N	148.0W				0.1	0.1	0.4	0.5	0.4	3.3	3.3	1.7	0.6	3.5	8.6	9.8	1.8	2.0	10.5	2.5	5.4	2.6	21.2	19.2	1.1
46002	42.5N	130.0W	1.2	0.2	0.9	1.1	0.8	1.5	1.0	1.5	3.5	0.6	2.6	3.1	6.2	6.9	6.3	12.4	28.6	0.6			2.8	6.1	2.2	7.8
46003	52.0N	156.0W	0.8	0.2		0.5	0.1	<.05	0.1	1.0	4.7	0.1	0.5	1.3	3.3	3.3	2.6	4.1	3.4			10.1	21.3	15.3	10.0	8.7
46004	51.0N	136.0W	0.3	0.4	0.6	0.1	0.6	0.8	1.2	0.6	2.2	0.6	0.3	1.0	1.1	5.1	4.5	7.0	8.3	<.05		2.9	12.5	4.9	11.4	20.9
46005	46.0N	131.0W	0.5	0.2		0.3	0.8	2.1	2.1	1.6	1.5	0.2		1.4	5.7	7.4	9.7	6.4	0.4			0.8	3.5	7.4	7.2	37.8
46006	40.7N	137.7W	0.1	0.7	0.1	0.6	1.2	0.4	0.1	0.7	3.7	4.1	2.5	1.7	6.2	7.7	5.1	6.3	12.1	13.4	5.0	0.2	3.7	4.3	5.9	11.1
46011	34.9N	120.9W	0.8	0.9	1.2	0.4	0.4	0.3	0.7	1.8	0.7	0.1	1.1	0.2	0.4	0.8	12.3	16.8						0.1	33.6	24.7
46012	37.4N	122.7W	0.7	<.05	0.2	0.2	1.1	0.9	1.4	1.8	5.8				0.9	0.2	3.9	31.9	14.4							36.4
46013	38.2N	123.3W	0.5	0.7			0.1	0.2	0.6	1.1	1.0	0.7	0.4	0.5	0.4	0.3	2.6	8.2	1.3		0.1	0.2			0.9	57.5
46014	39.2N	124.0W	1.1	0.7	0.4	0.2	0.4	0.2	0.4	1.5	8.3	0.4	1.1	2.0	2.4	0.1	0.6	7.5	6.5	<.05	0.1		0.8			52.0
46017	60.3N	172.3W		0.8		0.5	0.5	2.0	2.7	0.1	8.9	8.7	9.0	2.5	2.9	12.2	14.5	1.0	4.9	2.2	1.6	5.6	7.0	10.4	2.8	
46019	57.2N	170.3W	1.9	2.1	0.8	0.9	1.9	1.6	0.4		4.6	5.1	6.2	3.1	10.2	6.3	7.8	0.9	1.4	2.6	5.5	6.7	4.9	5.4	6.3	3.9
46020	55.9N	168.0W	4.5								5.2								10.4							
46022	40.8N	124.5W	5.0	2.0	0.9	1.0	2.5	1.0	1.9	1.5	40.2	3.0	0.1	0.7	3.2	2.3	2.2	5.1	26.5							0.8
46023	34.3N	120.7W	0.5						0.6	0.5	2.9							4.8	14.6							63.2
46024	33.0N	119.2W	0.5			0.2	0.5	0.6	1.9	1.8	2.0				0.2	1.3	8.3	20.8							2.0	58.5
46025	33.8N	119.3W	1.2	0.8	3.3	5.0	5.4	6.9	5.6	2.4	0.5	0.1	1.0	5.6	4.8	9.7	38.9	4.4							3.4	0.1
46026	37.8N	122.7W	0.5					0.1	1.4						0.8	10.5	21.1	15.6							11.1	38.9
51001	23.4N	162.3W										4.5	2.0							57.3	31.6					

JULY 1982			% FREQUENCY OF WIND SPEEDS (22- 33 KTS)								% FREQUENCY OF WIND SPEEDS (34-47 KTS)								% FREQUENCY OF WIND SPEEDS (>47 KTS)							
BUOY	LAT	LONG	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW
41002	32.3N	075.3W						0.3																		
41004	32.6N	078.7W						0.2																		
41006	29.3N	077.3W																								
42001	25.9N	089.7W																								
42002	26.0N	093.5W																								
42003	26.0N	086.0W																								
42007	30.1N	088.9W		0.2	0.3				0.2																	
42008	28.7N	095.3W																								
42011	29.6N	093.5W																								
44003	40.8N	068.5W																								
44004	39.0N	070.0W						0.6	0.2																	
44005	42.7N	068.3W	1.4	0.4		0.5	0.6	0.9		0.2																
44007	43.5N	070.1W																								
45001	48.0N	087.6W																								
45002	45.3N	086.3W					0.1	<.05																		
45003	45.3N	082.8W																								
45004	47.2N	086.5W	0.1							0.7																
45005	41.7N	082.5W																								
45006	47.3N	090.0W																								
45007	42.7N	087.1W																								
45008	44.3N	082.4W							0.3																	
46001	56.0N	148.0W				0.7																				
46002	42.5N	130.0W																								
46003	52.0N	156.0W	0.1		0.6	1.6	0.6	2.9	2.0	0.4				0.1												
46004	51.0N	136.0W	6.9	0.1	0.4	2.3	1.4	<.05	1.0	0.9																
46005	46.0N	131.0W					1.7	0.6	0.5	0.3																
46006	40.7N	137.7W	0.8	0.6			0.1	1.4																		
46011	34.9N	120.9W							2.5	0.2																
46012	37.4N	122.7W																								
46013	38.2N	123.3W								22.6																
46014	39.2N	124.0W	0.4							11.0																
46017	60.3N	172.3W																								
46019	57.2N	170.3W		0.8		1.2																				
46020	55.9N	168.0W	9.1								11.7								59.1							
46022	40.8N	124.5W	0.1																							
46023	34.3N	120.7W	2.4							10.4																
46024	33.0N	119.2W								1.5																
46025	33.8N	119.3W																								
46026	37.8N	122.7W																								
51001	23.4N	162.3W		3.5	1.2																					

AUGUST 1982			AIR TEMPERATURE (DEG C)							SEA TEMPERATURE (DEG C)							AIR-SEA TEMPERATURE DIFFERENCE (DEG C)						
BUOY	LAT	LONG	OBS	DAYS	MAX	DY HR	MIN	DY HR	MEAN	OBS	DAYS	MAX	DY HR	MIN	DY HR	MEAN	OBS	DAYS	MAX	DY HR	MIN	DY HR	MEAN
41001	34.7N	072.3W	604	26	28.2	08 15	21.5	12 17	25.3	607	26	29.0	16 21	25.2	31 05	26.3	607	26	01.0	21 07	-05.5	12 17	-00.9
41002	32.3N	075.3W	739	31	28.6	07 19	23.2	18 18	26.8	739	31	29.7	10 20	27.2	31 04	28.1	740	31	00.5	01 18	-05.3	13 06	-01.3
41006	29.3N	077.3W	742	31	29.3	28 21	23.1	23 11	27.8	742	31	29.8	04 20	28.5	20 06	29.0	742	31	00.3	26 15	-05.7	23 11	-01.2
42001	25.9N	089.7W	726	31	33.9	15 19	26.3	21 15	30.6	739	31	31.8	23 21	28.4	21 02	29.4	741	31	04.5	15 14	-02.4	12 20	01.2
42002	26.0N	093.5W	159	07	30.8	04 22	28.5	02 08	29.8	159	07	32.0	04 22	30.3	06 04	30.7	159	07	-00.2	01 15	-02.2	01 20	-00.9
42003	26.0N	086.0W	387	17	31.8	23 21	24.4	18 11	28.6	387	17	32.7	15 20	28.5	21 07	29.5	387	17	01.9	21 16	-05.0	18 11	-00.9
42007	30.1N	088.9W	621	27	31.6	28 23	23.3	16 17	28.7	620	27	31.8	29 02	28.2	07 12	30.1	625	27	00.4	26 03	-06.4	16 17	-01.3
42008	28.7N	095.3W	739	31	30.8	06 17	21.7	09 15	28.4	740	31	31.0	22 21	28.0	09 18	29.5	741	31	01.4	06 17	-06.9	09 15	-01.1
44003	40.8N	068.5W	742	31	21.2	25 21	12.3	03 10	16.5	742	31	19.8	05 16	12.3	03 10	14.9	742	31	06.6	20 21	-03.7	22 19	01.6
44004	39.0N	070.0W	734	31	26.7	25 21	15.9	29 12	23.1	734	31	27.4	19 20	24.0	26 10	25.5	737	31	00.7	25 21	-08.6	29 11	-02.4
44005	42.7N	068.3W	740	31	20.4	17 21	11.4	29 06	17.0														
44007	43.5N	070.1W	732	31	22.7	11 00	09.0	29 11	16.8	735	31	19.7	16 20	11.6	26 12	16.4	738	31	08.3	27 01	-05.1	22 09	00.4
44008	40.5N	069.4W	314	14	22.7	25 20	12.5	29 13	17.7	314	14	20.8	19 17	12.6	20 11	16.6	314	14	07.5	20 11	-04.6	22 18	01.1
45001	48.0N	087.6W	742	31	13.1	17 01	04.9	01 09	08.6	742	31	10.2	21 20	03.8	01 21	06.6	742	31	06.0	01 03	-00.4	28 09	02.0
45002	45.3N	086.3W	743	31	22.6	07 23	11.1	28 15	17.2	743	31	22.4	07 23	16.0	30 07	17.7	743	31	03.3	17 00	-05.3	28 15	-00.5
45003	45.3N	082.8W	742	31	21.2	06 22	08.8	28 16	15.4	742	31	18.9	07 21	10.9	28 19	14.9	742	31	04.2	16 23	-03.8	28 16	00.4
45004	47.2N	086.5W	733	31	13.7	18 22	04.3	05 09	07.8	738	31	08.4	22 01	03.5	01 01	05.3	742	31	07.2	13 21	-00.9	25 13	02.5
45005	41.7N	082.5W	743	31	26.4	04 22	15.3	28 15	21.8	743	31	26.1	03 21	21.4	30 09	23.7	743	31	02.3	19 23	-07.3	10 18	-01.9
45006	47.3N	090.0W	743	31	18.0	01 01	07.0	01 20	12.1	741	31	14.4	24 03	06.4	03 10	10.7	743	31	05.8	08 10	-02.8	27 15	01.4
45007	42.7N	087.1W	744	31	23.9	04 00	14.8	28 01	20.0	744	31	23.4	16 21	17.5	30 10	20.2	744	31	03.1	02 03	-05.3	10 09	-00.2
45008	44.3N	082.4W	742	31	22.2	19 20	11.7	28 17	17.2	741	31	20.7	16 22	16.0	30 01	18.1	742	31	04.0	02 01	-05.4	28 17	-00.8
46001	56.0N	148.0W	741	31	14.2	20 00	10.9	01 09	12.3	741	31	14.9	20 01	12.1	02 18	13.1	742	31	00.5	25 19	-02.5	31 17	-00.8
46002	42.5N	130.0W	744	31	18.3	03 21	14.1	15 20	16.7	744	31	19.6	09 00	17.3	03 13	17.9	744	31	00.2	05 20	-03.8	15 20	-01.2
46003	52.0N	156.0W	740	31	12.6	22 08	08.2	05 16	10.3	743	31	13.0	19 02	09.7	06 18	11.0	743	31	01.3	22 08	-02.4	06 01	-00.7
46004	51.0N	136.0W	734	31	14.7	24 18	09.6	03 08	12.5	737	31	14.2	30 02	11.2	02 12	12.5	743	31	01.3	06 22	-01.8	03 15	00.0
46005	46.0N	131.0W	741	31	17.7	28 22	12.2	04 10	14.7	741	31	19.7	29 00	15.7	05 17	16.8	742	31	-00.3	05 13	-04.1	04 00	-02.1
46006	40.7N	137.7W								737	31	18.1	21 02	16.7	01 08	17.2							
46011	34.9N	120.9W	741	31	17.9	13 23	11.8	02 15	14.0	741	31	17.0	28 23	12.4	12 07	14.4	741	31	02.5	13 02	-02.8	08 10	-00.4
46012	37.4N	122.7W	741	31	17.0	29 18	11.7	07 16	14.1	740	31	16.0	06 01	13.0	02 15	14.3	743	31	02.3	29 18	-02.8	08 10	-00.2
46013	38.2N	123.3W	742	31	15.8	30 01	10.1	22 15	13.3	743	31	14.6	14 19	09.6	02 23	11.6	744	31	03.9	06 02	-02.0	13 14	01.7
46014	39.2N	124.0W	743	31	17.2	30 00	10.4	22 14	13.7	743	31	17.1	29 22	10.5	02 07	12.8	743	31	03.5	11 21	-02.5	30 13	00.9
46017	60.3N	172.3W	244	31	09.1	04 03	05.2	06 09	07.3														
46019	57.2N	170.3W	243	31	10.6	06 06	05.8	05 18	08.0														
46022	40.8N	124.5W	742	31	17.5	27 22	11.6	23 12	14.0	743	31	16.3	21 01	10.7	07 20	13.5	744	31	03.4	11 08	-02.9	23 19	00.5
46023	34.3N	120.7W	741	31	18.4	13 22	12.8	02 15	14.8	741	31	18.3	14 00	13.5	10 17	15.3	741	31	02.1	28 18	-02.7	08 17	-00.6
46024	33.0N	119.2W	738	31	19.8	27 22	14.2	20 15	15.9	740	31	20.1	27 23	15.8	23 06	17.1	743	31	00.8	27 21	-03.3	03 06	-01.2
46025	33.8N	119.3W	743	31	22.4	05 21	15.5	16 13	18.2	742	31	22.3	05 22	16.6	13 17	18.8	744	31	01.4	20 15	-03.6	08 08	-00.7
46026	37.8N	122.7W	561	24	15.3	16 23	09.8	21 17	12.6	562	24	14.2	07 22	09.9	02 11	12.5	564	24	02.3	11 08	-03.2	07 17	00.1
51001	23.4N	162.3W	740	31	27.2	26 03	24.0	05 19	26.2	740	31	27.3	09 01	26.4	17 14	26.8	741	31	00.2	26 20	-02.8	05 19	-00.6

AUGUST 1982			PRESSURE (MB)							WIND SPEEDS (KNOTS)				MEAN WIND SPEED (KNOTS)								
BUOY	LAT	LONG	OBS	DAYS	MAX	DY HR	MIN	DY HR	MEAN	OBS	MAX	DY HR	DIR	N	NE	E	SE	S	SW	W	NW	TOTAL
41001	34.7N	072.3W	607	26	1027.8	30 15	1010.8	21 23	1018.8	599	27	21 04	240	13.0	11.0	9.5	12.2	12.9	12.3	11.5	9.6	11.9
41002	32.3N	075.3W	740	31	1025.3	30 15	1011.5	03 09	1018.4	723	24	02 06	260	10.8	11.9	8.3	7.4	8.7	11.1	9.8	7.2	10.0
41006	29.3N	077.3W	742	31	1023.7	20 16	1011.4	03 09	1018.5	733	23	30 02	050	8.4	11.5	9.5	6.9	8.0	9.0	9.3	9.6	08.8
42001	25.9N	089.7W	740	31	1021.3	23 17	1011.7	16 09	1017.2	686	24	02 09	190	6.3	7.6	8.7	7.4	6.6	5.4	3.6	6.9	07.4
42002	26.0N	093.5W	159	07	1018.9	01 04	1014.3	07 10	1016.6	159	18	02 15	160		8.7	8.1	7.6	9.9				08.3
42003	26.0N	086.0W	387	17	1021.1	20 16	1011.8	16 09	1016.8	355	19	31 08	070	4.3	5.9	6.9	3.2	5.9	4.6	2.9	3.0	06.1
42007	30.1N	088.9W	617	27	1021.9	31 16	1012.4	18 09	1017.2	605	17	25 05	210	5.0	7.6	8.0	6.7	6.8	7.7	7.7	6.2	07.3
42008	28.7N	095.3W	740	31	1019.6	31 16	1011.8	16 00	1016.2	732	19	07 16	040	5.5	6.6	7.0	8.3	10.6	8.4	2.2	5.6	09.0
44003	40.8N	068.5W	742	31	1029.6	30 15	1001.3	25 23	1016.7	697	21	26 01	250	6.7	7.3	5.8	7.4	7.4	7.3	7.3	7.1	07.2
44004	39.0N	070.0W	736	31	1029.4	30 15	1005.7	25 20	1017.3	731	25	25 20	220	10.4	10.1	3.9	5.3	12.1	12.6	8.8	7.3	10.1
44005	42.7N	068.3W	739	31	1027.9	30 15	997.6	26 02	1015.7	740	33	26 08	280	10.5	9.6	10.0	12.3	12.9	12.1	11.6	9.7	11.6
44007	43.5N	070.1W	736	31	1027.1	30 14	995.3	26 04	1015.6	732	26	26 04	280	9.3	6.8	7.5	9.0	11.6	10.4	8.0	9.1	09.7
44008	40.5N	069.4W	319	14	1029.7	30 15	1001.6	25 20	1016.9	307	24	26 00	260	11.1	8.5	1.3	11.0	8.9	9.9	10.5	9.4	09.9
45001	48.0N	087.6W	742	31	1026.3	28 17	1003.7	08 23	1016.2	734	20	27 11	300	6.5	6.9	5.9	7.1	6.6	7.9	7.6	9.0	07.4
45002	45.3N	086.3W	743	31	1027.1	28 19	1005.2	22 20	1016.5	726	21	21 01	350	8.7	7.6	6.5	5.7	6.3	8.9	6.8	8.8	08.8
45003	45.3N	082.8W	742	31	1026.6	29 08	1004.9	08 23	1016.3	704	20	27 20	310	6.0	8.1	7.7	5.3	7.9	7.8	6.5	9.9	08.2
45004	47.2N	086.5W	738	31	1027.0	28 18	1004.1	22 12	1016.5	718	16	09 14	310	5.9	5.6	5.5	6.0	6.5	6.2	6.6	7.6	06.6
45005	41.7N	082.5W	743	31	1028.4	29 12	1001.7	25 08	1017.3	704	23	25 09	270	10.3	8.6	6.9	5.7	6.5	10.1	9.5	9.0	08.7
45006	47.3N	090.0W	743	31	1027.9	28 17	1004.6	03 13	1016.7	652	22	01 15	070	5.6	7.4	7.1	6.2	6.7	6.2	7.6	7.4	06.9
45007	42.7N	087.1W	744	31	1026.4	29 02	1004.1	25 01	1016.8	729	22	25 03	030	9.5	7.7	6.1	5.3	8.6	10.0	7.5	8.2	08.2
45008	44.3N	082.4W	741	31	1027.2	29 12	1005.2	09 14	1016.5	725	22	22 21	210	9.4	8.9	6.7	5.1	8.7	10.2	9.0	9.5	09.1
46001	56.0N	148.0W	740	31	1027.8	19 21	1004.5	07 06	1016.5	730	21	30 02	270	3.7	11.3	10.0	8.1	9.9	10.1	11.1	9.5	10.2
46002	42.5N	130.0W	743	31	1028.8	21 17	1011.9	26 13	1020.5	735	22	22 15	010	12.0	7.5	7.6	5.8	7.2	9.3	9.3	9.9	10.1
46003	52.0N	156.0W	743	31	1032.0	01 03	998.9	05 20	1018.6	731	28	05 10	120	9.9	11.7	15.1	14.2	13.8	13.1	12.1	10.8	12.4
46004	51.0N	136.0W	740	31	1033.6	21 19	1001.5	05 09	1020.5	730	29	05 03	100	13.4	15.0	19.0	17.8	11.8	10.1	10.6	11.8	12.2
46005	46.0N	131.0W	741	31	1031.3	21 18	1010.5	05 11	1020.1	736	23	05 04	200	12.0	4.3	2.7	5.3	11.7	10.0	10.6	13.8	12.1
46006	40.7N	137.7W	736	31	1034.1	22 17	1015.7	04 00	1023.9	736	26	09 19	250	14.6	12.9	8.6	8.9	12.5	13.3	14.2	13.8	13.4
46011	34.9N	120.9W	741	31	1018.4	20 19	1009.2	02 01	1014.7	732	25	02 00	280	8.2	3.2	2.9	3.8	3.0	4.1	12.9	11.8	11.2
46012	37.4N	122.7W	741	31	1020.8	05 18	1011.5	02 13	1016.2	696	19	11 06	320	8.7	1.0	2.0	3.3	8.7	3.7	4.1	7.7	07.7
46013	38.2N	123.3W	743	31	1021.3	05 19	1010.8	02 10	1016.6	695	28	01 03	310	6.5	3.3	2.2	5.6	5.7	2.5	10.3	15.4	14.8
46014	39.2N	124.0W	743	31	1021.9	20 19	1012.4	02 09	1017.0	730	24	02 08	330	8.1	4.2	2.8	4.8	7.6	5.2	3.7	11.3	09.0
46017	60.3N	172.3W	246	31	1030.9	20 21	992.8	29 15	1012.4	246	28	07 06	180	12.5	10.2	8.9	11.3	12.6	11.2	10.8	15.2	10.9
46019	57.2N	170.3W	246	31	1028.0	01 09	993.1	29 12	1013.3	246	30	10 06	250	9.7	10.8	12.0	11.4	10.9	15.0	15.0	11.0	12.5
46022	40.8N	124.5W	744	31	1023.2	05 23	1012.8	13 12	1017.8	701	18	19 04	360	7.1	3.9	3.0	2.8	4.7	3.4	2.8	5.2	05.9
46023	34.3N	120.7W	741	31	1017.9	13 19	1009.9	02 02	1014.3	737	25	09 10	330	15.6	3.0	4.1	3.8		10.0	6.8	17.3	16.7
46024	33.0N	119.2W	738	31	1017.7	13 19	1009.8	02 02	1013.9	716	24	11 03	300	6.0	2.3	1.0	4.5	5.8	3.1	7.4	13.5	12.4
46025	33.8N	119.3W	743	31	1018.0	13 19	1009.7	11 01	1014.1	726	14	07 01	280	2.9	1.8	2.3	2.9	3.5	4.0	6.7	4.9	05.4
46026	37.8N	122.7W	562	24	1020.6	20 19	1010.5	02 09	1015.9	563	22	01 03	300	3.6	4.0		4.0	6.0	5.5	8.1	11.7	09.4
51001	23.4N	162.3W	740	31	1020.4	12 09	1013.3	16 02	1016.6	739	25	11 18	080		16.6	16.8	10.4					16.7

AUGUST 1982			WAVE HEIGHTS (METERS)				FREQUENCY OF WAVE HEIGHTS (%)							
BUOY	LAT	LONG	OBS	MAX	DY HR	MEAN	<1M	1-1.5M	2-2.5M	3-3.5M	4-5.5M	6-7.5M	8-9.5M	>9.5M
41001	34.7N	072.3W	606	2.5	21 04	1.1	20.4	69.8	9.7					
41002	32.3N	075.3W	736	3.0	29 14	1.1	13.3	76.2	9.2	1.2				
41006	29.3N	077.3W	740	4.0	30 05	1.1	6.4	86.7	2.9	3.5	0.2			
42001	25.9N	089.7W	740	2.0	31 21	0.5	85.9	13.7	0.2					
42002	26.0N	093.5W	158	1.5	02 18	0.6	67.0	32.9						
42003	26.0N	086.0W	385	2.5	31 10	0.5	83.1	12.4	4.4					
44003	40.8N	068.5W	742	3.0	26 01	1.0	25.4	64.5	9.1	0.8				
44004	39.0N	070.0W	720	3.0	29 12	1.0	32.3	58.7	8.6	0.4				
44005	42.7N	068.3W	740	4.0	26 08	0.9	35.0	61.2	2.8	0.5	0.4			
44007	43.5N	070.1W	724	2.0	09 22	0.6	67.4	32.3	0.2					
44008	40.5N	069.4W	302	3.0	26 00	1.0	39.7	47.3	11.9	0.9				
45001	48.0N	087.6W	740	2.0	27 14	0.4	79.1	20.5	0.2					
45002	45.3N	086.3W	731	3.0	22 14	0.6	69.0	26.6	3.9	0.2				
45003	45.3N	082.8W	737	2.5	10 04	0.6	64.9	30.1	4.8					
45004	47.2N	086.5W	722	1.5	01 20	0.3	84.6	15.3						
45005	41.7N	082.5W	740	1.5	17 22	0.5	70.0	30.0						
45006	47.3N	090.0W	738	2.0	01 16	0.3	83.3	15.8	0.8					
45007	42.7N	087.1W	740	2.5	25 09	0.6	67.7	28.7	3.5					
45008	44.3N	082.4W	737	2.5	22 19	0.7	52.9	40.5	6.5					
46001	56.0N	148.0W	726	3.5	07 07	1.5	13.2	50.4	34.1	2.2				
46002	42.5N	130.0W	739	3.0	22 06	1.4	10.6	62.1	23.2	3.9				
46003	52.0N	156.0W	672	4.0	23 05	1.4	17.5	52.2	25.1	4.9	0.1			
46004	51.0N	136.0W	732	4.0	07 04	1.2	17.4	63.9	16.3	1.9	0.2			
46005	46.0N	131.0W	737	3.0	06 14	1.4	16.6	47.4	35.5	0.2				
46006	40.7N	137.7W	730	3.0	05 16	1.4	6.7	66.5	25.3	1.3				
46011	34.9N	120.9W	687	3.0	01 09	1.4	2.4	77.0	19.0	1.4				
46012	37.4N	122.7W	737	2.5	01 01	1.1	14.9	76.1	8.9					
46013	38.2N	123.3W	740	3.0	01 00	1.3	11.6	63.6	24.5	0.1				
46014	39.2N	124.0W	735	2.5	01 02	1.3	14.2	65.7	20.0					
46022	40.8N	124.5W	739	3.5	22 17	1.2	18.1	59.6	20.0	2.1				
46023	34.3N	120.7W	738	4.0	10 21	1.8	0.1	48.6	44.1	6.9	0.1			
46024	33.0N	119.2W	714	3.0	10 23	1.3	8.8	79.6	11.0	0.4				
46025	33.8N	119.3W	201	1.5	20 01	0.9	25.4	74.5						
46026	37.8N	122.7W	547	2.0	01 00	1.0	13.5	83.3	3.1					
51001	23.4N	162.3W	736	4.0	02 10	2.2		18.7	66.7	14.4	0.1			

AUGUST 1982			TOTAL FREQUENCY OF WIND SPEEDS (%)							TOTAL FREQUENCY OF WIND DIRECTIONS (%)							
BUOY	LAT	LONG	CALM	<4KT	4-10KT	11-21KT	22-33KT	34-47KT	>47KT	N	NE	E	SE	S	SW	W	NW
41001	34.7N	072.3W		3.8	36.2	58.3	1.7			11.6	18.3	7.0	9.6	26.1	16.4	9.0	2.0
41002	32.3N	075.3W		2.8	58.9	36.7	1.7			5.7	14.6	13.1	10.6	15.0	33.9	5.7	1.4
41006	29.3N	077.3W		7.2	63.8	28.6	0.3			3.1	7.3	12.7	14.2	16.2	32.5	11.5	2.6
42001	25.9N	089.7W		16.8	62.7	20.4	0.1			8.2	16.2	27.7	22.8	14.7	4.7	2.4	3.2
42002	26.0N	093.5W		3.8	75.5	20.8					25.0	23.7	37.6	13.7			
42003	26.0N	086.0W	13.0	42.5	44.2	13.2				7.0	18.4	18.7	19.2	19.3	10.8	3.7	2.9
42007	30.1N	088.9W		16.5	64.5	19.0				2.8	5.0	16.4	16.6	17.6	20.5	16.2	5.0
42008	28.7N	095.3W	1.0	7.2	56.7	36.1				3.6	4.3	9.4	27.2	46.8	7.9	0.6	0.6
44003	40.8N	068.5W		12.6	72.3	15.1				9.3	10.3	4.2	5.0	21.1	28.3	15.9	5.9
44004	39.0N	070.0W		10.9	44.9	43.2	1.0			16.6	9.8	1.6	1.9	14.0	22.2	17.9	16.0
44005	42.7N	068.3W		4.6	42.2	50.1	3.1			12.1	6.3	4.0	4.8	21.8	31.1	13.4	7.4
44007	43.5N	070.1W		6.0	54.0	38.4	1.6			6.9	5.5	5.0	4.4	19.4	34.3	15.1	7.7
44008	40.5N	069.4W		5.2	54.4	38.8	1.6			14.8	5.6	0.7	4.8	15.6	30.0	18.3	8.1
45001	48.0N	087.6W		12.0	69.8	18.3				6.5	5.9	5.5	8.0	16.5	18.2	26.0	12.6
45002	45.3N	086.3W		12.9	62.0	25.1				16.1	8.1	5.6	4.8	8.7	30.6	12.0	13.0
45003	45.3N	082.8W		15.9	55.4	28.7				5.4	3.7	6.1	4.9	9.1	21.2	19.3	35.2
45004	47.2N	086.5W		12.8	78.0	9.2				6.9	3.2	7.5	9.9	12.4	13.6	21.5	25.1
45005	41.7N	082.5W		8.9	62.5	28.3	0.3			6.3	15.7	11.9	5.1	8.3	21.3	22.1	9.6
45006	47.3N	090.0W		18.4	64.9	16.6	0.2			5.6	12.7	18.4	8.7	11.5	19.2	16.9	15.1
45007	42.7N	087.1W		14.0	60.2	25.7	0.1			10.0	13.3	8.5	10.5	14.3	17.6	7.0	18.7
45008	44.3N	082.4W		11.0	53.0	35.9	0.1			15.1	10.6	3.2	4.1	13.6	21.1	13.6	18.7
46001	56.0N	148.0W		8.4	43.3	48.4				0.8	4.7	10.9	8.5	8.7	21.0	33.7	11.7
46002	42.5N	130.0W		9.7	42.3	47.8	0.3			37.2	8.3	2.8	2.7	3.8	7.0	8.9	29.3
46003	52.0N	156.0W		4.1	36.5	52.3	7.1			8.7	4.5	9.7	6.6	15.6	18.0	18.7	18.2
46004	51.0N	136.0W		1.9	38.8	55.5	3.8			13.8	1.3	1.6	6.7	8.8	12.9	18.7	36.4
46005	46.0N	131.0W		6.0	36.8	53.8	3.4			22.7	2.2	1.0	0.2	6.4	7.6	17.4	42.4
46006	40.7N	137.7W		2.6	24.5	69.6	3.4			25.8	23.3	5.8	2.0	3.2	10.0	12.6	17.2
46011	34.9N	120.9W		8.2	33.3	55.1	3.4			5.5	1.9	1.9	1.4	0.1	3.0	27.7	58.4
46012	37.4N	122.7W		17.2	56.3	26.4				21.4	0.1	0.1	0.7	7.5	0.7	5.3	64.2
46013	38.2N	123.3W		4.3	27.5	56.3	11.9			2.5	0.1	1.0	2.7	3.5	0.4	6.0	83.8
46014	39.2N	124.0W		10.5	55.1	33.2	1.2			42.8	4.9	1.5	3.0	3.1	0.7	1.4	42.6
46017	60.3N	172.3W		2.4	49.2	45.9	2.4			7.2	28.8	13.5	3.5	11.8	28.4	5.3	1.6
46019	57.2N	170.3W		7.3	26.8	63.0	2.8			5.6	17.6	10.3	11.7	10.1	20.2	17.2	7.4
46022	40.8N	124.5W		29.0	61.5	9.6				60.1	8.9	4.8	3.1	3.5	2.4	3.3	13.9
46023	34.3N	120.7W		2.3	11.4	73.1	13.2			12.0	0.4	1.1	0.2		0.1	1.6	84.6
46024	33.0N	119.2W		5.2	29.5	62.4	2.9			1.9	0.2	0.1	0.6	1.1	1.5	10.2	84.3
46025	33.8N	119.3W		31.7	63.5	4.8				3.2	1.3	2.3	5.7	7.9	12.5	56.3	10.8
46026	37.8N	122.7W		5.5	55.6	38.7	0.2			0.3	0.2		0.8	8.0	7.3	36.0	47.5
51001	23.4N	162.3W			3.2	94.0	2.7				42.9	56.6	0.5				

AUGUST 1982			% FREQUENCY OF WIND SPEEDS (<4 KTS)								% FREQUENCY OF WIND SPEEDS (4-10 KTS)								% FREQUENCY OF WIND SPEEDS (11-21 KTS)							
BUOY	LAT	LONG	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW
41001	34.7N	072.3W	1.3	1.1	0.3	0.8	0.2			0.2	2.8	6.3	4.1	2.7	6.3	6.5	4.3	1.2	6.8	10.9	2.6	6.1	17.5	9.4	4.3	0.7
41002	32.3N	075.3W		0.2	0.5	0.3	0.7	0.2	0.3	0.5	2.6	5.2	10.2	8.8	9.9	10.4	3.3	0.7	3.1	8.3	2.8	1.5	4.4	14.6	2.0	0.2
41006	29.3N	077.3W	0.3	1.6	1.2	1.1	0.7	1.2	0.9	0.2	1.9	1.9	6.1	12.3	12.3	21.5	6.7	1.1	0.8	3.5	5.4	8.0	3.2	9.8	4.0	1.2
42001	25.9N	089.7W	1.9	2.5	2.3	2.5	3.6	2.1	1.4	0.6	5.2	10.0	17.2	16.1	8.7	2.2	1.0	2.2	1.1	3.7	8.1	4.3	2.3	0.4		0.6
42002	26.0N	093.5W		1.3	0.6	0.8	1.1					20.4	19.3	30.2	5.6					3.3	3.8	6.6	7.1			
42003	26.0N	086.0W	2.0	7.2	5.7	12.6	5.9	4.4	2.7	1.8	5.1	7.3	8.5	4.9	11.9	4.9	0.7	1.1		3.9	4.5	1.5	1.5	1.6	0.2	
42007	30.1N	088.9W	1.3	0.8	1.8	3.2	3.7	2.6	2.1	1.0	1.4	2.7	10.2	10.6	11.0	14.2	10.7	3.7	0.1	1.4	4.4	2.8	2.9	3.7	3.3	0.3
42008	28.7N	095.3W	0.6	1.0	0.8	1.4	1.3	1.3	0.5	0.3	2.4	2.0	7.3	20.1	19.7	4.1	0.1	0.2	0.5	0.5	1.3	5.7	25.7	2.2		0.1
44003	40.8N	068.5W	1.6	0.8	0.4	0.8	2.7	3.3	1.6	1.5	6.6	8.4	3.8	3.3	14.2	20.7	12.0	3.2	1.0	1.0		0.9	4.2	4.4	2.3	1.2
44004	39.0N	070.0W	1.3	0.5	0.8	0.6	1.3	1.9	2.7	1.9	7.4	4.5	0.8	1.1	4.0	5.4	9.7	11.9	7.7	4.8		0.2	8.0	14.2	5.5	2.2
44005	42.7N	068.3W	1.2	0.3	0.4	0.4	0.6	0.3	0.6	0.6	5.2	3.3	1.7	1.6	5.6	13.5	7.2	4.0	5.5	2.7	1.6	1.7	14.8	16.7	4.3	2.7
44007	43.5N	070.1W	0.3	0.6	0.5	0.4	0.5	1.4	1.3	1.0	5.5	4.4	4.0	2.7	6.6	15.2	11.3	4.2	3.0	0.5	0.5	1.2	12.2	16.9	1.9	2.1
44008	40.5N	069.4W		1.1	0.7	0.1	0.7	1.3	0.6	0.7	7.3	2.1		2.9	10.3	16.6	10.3	4.9	7.2	2.4		3.9	4.6	11.7	6.6	2.4
45001	48.0N	087.6W	1.3	1.1	0.8	1.5	2.2	2.1	1.3	1.6	4.8	3.0	4.4	4.6	13.0	12.7	19.8	6.5	0.5	0.9	0.2	1.9	1.3	4.2	4.8	4.5
45002	45.3N	086.3W	2.8	0.6	0.6	1.2	2.0	3.1	1.8	1.5	10.6	6.5	4.5	2.3	5.2	17.1	8.4	7.3	5.4	1.1	0.3	0.4	1.5	10.4	1.8	4.2
45003	45.3N	082.8W	1.4	0.7	1.0	1.5	1.9	2.8	1.0	1.8	3.0	1.7	3.8	2.8	4.2	13.3	7.4	19.2	0.6	1.2	1.3	0.4	3.0	4.9	2.6	14.6
45004	47.2N	086.5W	1.1	0.9	1.0	1.5	2.3	1.8	3.0	1.3	5.4	2.2	6.4	8.0	8.7	11.0	16.4	19.8	0.4	0.1		0.4	1.4	0.7	2.1	4.1
45005	41.7N	082.5W	0.4	0.9	1.7	1.7	1.6	1.1	0.9	0.5	3.0	10.3	9.4	3.3	5.1	11.2	14.0	6.1	2.5	4.4	0.8	0.1	1.4	9.1	7.1	2.9
45006	47.3N	090.0W	1.3	2.9	3.4	2.1	2.2	2.3	2.3	1.2	3.7	6.7	4.5	5.4	7.4	15.0	11.0	11.1	0.6	3.0	2.3	1.2	1.9	1.1	3.6	2.9
45007	42.7N	087.1W	1.4	2.3	2.2	2.7	1.4	0.8	1.1	2.2	11.4	7.7	5.3	7.3	8.7	10.0	4.6	5.3	5.2	3.2	1.0	0.4	4.2	7.0	1.3	3.2
45008	44.3N	082.4W	1.3	0.7	0.3	1.3	1.7	2.4	1.6	1.9	8.1	6.3	2.2	2.4	7.5	9.1	7.2	10.1	5.7	3.6	0.7	0.4	4.4	9.4	4.0	6.8
46001	56.0N	148.0W	0.5	0.4	0.9	0.8	0.6	1.0	2.3	1.8	0.3	1.8	4.8	4.9	3.9	11.1	11.8	4.5		2.4	5.2	2.0	4.2	8.8	19.7	5.3
46002	42.5N	130.0W	1.3	1.5	0.6	0.8	0.9	0.7	1.4	2.4	12.7	4.6	1.5	1.7	1.8	3.0	3.7	13.4	22.9	2.2	0.7	0.2	1.1	3.3	3.8	13.5
46003	52.0N	156.0W	1.5	0.5	0.1	0.2	0.2	0.2	0.3	1.1	4.2	2.4	2.2	2.0	2.9	6.9	7.4	8.5	1.9	0.6	5.5	3.4	12.5	9.1	10.6	8.6
46004	51.0N	136.0W			0.1	0.2	0.1	0.6	0.3	0.4	2.4		0.1	0.9	3.9	7.4	10.4	13.7	11.4	1.1	0.6	3.8	4.8	4.7	7.7	22.3
46005	46.0N	131.0W	1.1	0.8	0.7	0.2	0.3	0.6	1.7	0.5	10.5	1.4	0.2		3.1	4.1	7.1	10.4	10.4			<.05	2.4	2.5	8.1	30.4
46006	40.7N	137.7W	1.0	0.3	0.5	<.05		0.3	0.2	0.3	2.8	6.8	3.8	1.4	0.7	3.4	2.6	3.0	21.7	15.1	1.6	0.6	2.5	5.4	9.0	13.6
46011	34.9N	120.9W	0.6	1.2	1.5	0.7	0.4	1.0	1.6	1.4	3.0	0.7	0.4	0.7		2.0	4.2	17.3	1.7						14.1	39.2
46012	37.4N	122.7W	3.0	0.1	0.1	0.5	0.6	0.5	2.0	2.0	9.5			0.2	3.9	0.2	3.2	39.4	8.0				3.0		0.1	15.3
46013	38.2N	123.3W	0.2	0.1	0.3	0.3	0.4	0.2	0.3	0.2	1.6	<.05	0.1	1.7	2.7	0.2	1.9	17.2	0.4			0.1			2.7	52.9
46014	39.2N	124.0W	3.0	1.9	1.2	1.3	0.3	0.2	0.6	1.9	29.2	3.0	0.3	1.6	2.8	0.5	0.6	10.0	10.6	<.05		0.1	0.8			21.5
46017	60.3N	172.3W		0.4	0.4			1.6				16.9	9.5	1.9	6.3	10.8	2.6		5.7	11.5	3.7	1.4	3.6	16.0	2.6	1.5
46019	57.2N	170.3W	1.2	1.2	1.6	1.7	1.0	0.1		0.4	1.3	7.7	2.4	2.6	3.4	4.0	2.3	3.0	3.0	8.2	5.9	6.8	5.7	15.7	13.7	4.5
46022	40.8N	124.5W	9.5	4.2	3.6	2.6	1.4	1.6	2.3	3.9	41.3	4.7	1.2	0.5	2.2	0.8	1.0	9.8	9.3							0.3
46023	34.3N	120.7W	0.4	0.3	0.4	<.05			0.2	1.0	2.1	0.1	0.7	0.2		0.1	1.0	7.1	8.8						0.3	64.0
46024	33.0N	119.2W	0.4	0.2	0.1	0.3		0.9	2.0	1.2	1.5	0.1		0.3	1.1	0.5	6.2	19.7							2.0	60.4
46025	33.8N	119.3W	2.3	1.2	2.0	4.2	4.4	5.5	6.4	3.8	0.9	0.1	0.3	1.5	3.5	7.0	43.5	6.6						<.05	4.4	0.4
46026	37.8N	122.7W	0.1			0.2	0.8	0.8	1.7	1.8	0.2	0.2		0.6	7.2	6.5	25.6	15.4							0.7	30.1
51001	23.4N	162.3W										0.8	2.2	0.3						41.0	52.8	0.2				

AUGUST 1982			% FREQUENCY OF WIND SPEEDS (22- 33 KTS)								% FREQUENCY OF WIND SPEEDS (34-47 KTS)								% FREQUENCY OF WIND SPEEDS (>47 KTS)							
BUOY	LAT	LONG	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW
41001	34.7N	072.3W	0.7				0.2	0.5	0.3																	
41002	32.3N	075.3W		0.8				0.7	0.1																	
41006	29.3N	077.3W		0.3																						
42001	25.9N	089.7W					0.1																			
42002	26.0N	093.5W																								
42003	26.0N	086.0W																								
42007	30.1N	088.9W																								
42008	28.7N	095.3W																								
44003	40.8N	068.5W																								
44004	39.0N	070.0W	0.3					0.7																		
44005	42.7N	068.3W	0.2			0.3	0.5	0.6	1.3	0.1																
44007	43.5N	070.1W				0.1	0.1	0.4	0.5	0.4																
44008	40.5N	069.4W	0.3					0.3	0.9	0.1																
45001	48.0N	087.6W																								
45002	45.3N	086.3W																								
45003	45.3N	082.8W																								
45004	47.2N	086.5W																								
45005	41.7N	082.5W	0.1						0.1	<.05																
45006	47.3N	090.0W		<.05	0.1																					
45007	42.7N	087.1W		0.1																						
45008	44.3N	082.4W						0.1																		
46001	56.0N	148.0W																								
46002	42.5N	130.0W	0.3																							
46003	52.0N	156.0W	1.0	1.0	1.9	1.1		1.7	0.3																	
46004	51.0N	136.0W			0.8	1.9	0.7	0.1	0.3																	
46005	46.0N	131.0W	0.8				0.6	0.3	0.5	1.1																
46006	40.7N	137.7W	0.4	1.1				0.8	0.7	0.3																
46011	34.9N	120.9W							3.0	0.4																
46012	37.4N	122.7W																								
46013	38.2N	123.3W								11.9																
46014	39.2N	124.0W								1.2																
46017	60.3N	172.3W	0.3			0.1	1.9			0.1																
46019	57.2N	170.3W		0.4	0.3	0.5		0.5	1.1																	
46022	40.8N	124.5W																								
46023	34.3N	120.7W	0.7							12.4																
46024	33.0N	119.2W								2.9																
46025	33.8N	119.3W																								
46026	37.8N	122.7W								0.2																
51001	23.4N	162.3W		1.3	1.6																					

SEPTEMBER 1982			AIR TEMPERATURE (DEG C)							SEA TEMPERATURE (DEG C)							AIR-SEA TEMPERATURE DIFFERENCE (DEG C)						
BUOY	LAT	LONG	OBS	DAYS	MAX	DY HR	MIN	DY HR	MEAN	OBS	DAYS	MAX	DY HR	MIN	DY HR	MEAN	OBS	DAYS	MAX	DY HR	MIN	DY HR	MEAN
41001	34.7N	072.3W	720	30	26.6	04 15	19.2	28 19	24.2	720	30	27.6	04 16	24.4	30 11	25.3	720	30	01.2	27 09	-05.6	28 19	-01.1
41002	32.3N	075.3W	720	30	27.9	04 17	21.6	30 17	25.8	720	30	28.5	19 19	27.0	03 08	27.6	720	30	00.3	04 15	-05.8	30 17	-01.8
41006	29.3N	077.3W	719	30	30.1	11 21	23.9	27 14	27.7	719	30	31.4	05 22	28.1	26 23	29.3	719	30	00.4	22 16	-04.5	25 21	-01.5
42001	25.9N	089.7W	711	30	33.7	24 15	24.7	25 17	29.8	720	30	30.5	03 21	27.7	25 08	28.7	720	30	03.8	04 15	-03.2	25 11	01.1
42002	26.0N	093.5W	150	07	29.7	24 21	25.7	30 15	28.0	150	07	30.2	29 21	28.2	26 08	29.5	150	07	-00.2	29 23	-03.2	30 15	-01.5
42003	26.0N	086.0W	715	30	31.6	10 19	22.4	25 14	27.6	716	30	31.3	10 20	28.0	22 09	29.1	719	30	00.8	11 15	-06.8	26 15	-01.5
42007	30.1N	088.9W	718	30	31.2	03 23	16.9	22 14	26.3	718	30	32.8	02 23	26.1	28 09	28.5	719	30	01.1	16 23	-10.6	22 14	-02.2
42008	28.7N	095.7W	006	01	29.4	01 02	29.2	01 00	29.3	220	10	31.1	02 22	28.9	10 01	29.9	467	26	00.4	10 01	-01.8	02 22	-00.1
44003	40.8N	068.5W	720	30	19.5	27 19	14.0	09 09	16.2	720	30	17.5	15 02	13.5	04 06	15.2	720	30	05.2	03 07	-02.0	17 02	01.0
44004	39.0N	070.0W	711	30	25.3	03 15	18.9	29 11	22.2	711	30	26.0	13 19	24.1	25 10	24.8	714	30	00.8	03 15	-05.9	09 11	-02.5
44005	42.7N	068.3W	719	30	22.0	11 17	12.4	09 09	15.3														
44007	43.5N	070.1W	699	30	23.2	10 23	09.8	26 12	14.5	699	30	18.2	12 18	13.4	01 19	15.3	709	30	07.6	10 23	-05.2	18 10	-00.8
44008	40.5N	069.4W	709	30	21.1	03 09	12.6	09 10	16.8	710	30	18.6	05 18	12.9	08 04	16.6	712	30	04.4	21 07	-03.3	07 11	00.2
45001	48.0N	087.6W	719	30	14.7	13 02	05.4	25 14	09.7	720	30	09.8	12 17	07.5	25 11	08.5	720	30	05.4	08 22	-02.3	15 17	01.2
45002	45.3N	086.3W	719	30	20.1	11 05	08.9	21 00	14.4	719	30	17.0	01 23	13.3	27 04	15.5	719	30	03.8	11 05	-06.6	16 08	-01.1
45003	45.3N	082.8W	720	30	18.9	14 05	08.6	21 04	12.7	720	30	14.3	14 02	09.3	03 17	11.8	720	30	06.3	06 00	-03.4	16 16	00.6
45004	47.2N	086.5W	719	30	14.1	12 00	05.4	16 01	08.9	719	30	08.3	30 21	05.6	03 14	07.0	720	30	07.1	12 01	-01.7	26 00	01.9
45005	41.7N	082.5W	719	30	25.9	13 21	11.0	21 12	18.2	719	30	23.4	13 22	17.9	29 12	20.3	719	30	03.0	13 21	-08.4	21 12	-02.1
45006	47.3N	090.0W	720	30	19.4	12 05	06.6	25 15	12.4	720	30	15.2	12 00	10.6	25 06	11.9	720	30	05.4	11 20	-04.0	25 15	00.5
45007	42.7N	087.1W	719	30	22.1	13 03	10.9	21 14	16.9	719	30	19.9	13 22	14.7	25 09	17.6	719	30	03.2	30 02	-06.7	16 14	-00.8
45008	44.3N	082.4W	719	30	21.0	13 22	10.0	21 13	15.2	719	30	17.7	13 20	13.8	18 09	15.7	719	30	03.3	13 22	-04.4	21 06	-00.5
46001	56.0N	148.0W	720	30	13.1	25 03	06.6	29 16	11.2	720	30	13.6	01 22	10.9	30 09	12.1	720	30	00.9	14 20	-02.7	23 14	-00.9
46002	42.5N	130.0W	717	30	19.8	05 20	14.0	24 19	17.3	717	30	19.6	05 20	16.4	29 13	17.9	717	30	00.4	06 23	-03.6	24 19	-00.8
46003	52.0N	156.0W	711	30	13.2	14 14	07.1	23 01	10.5	715	30	12.1	02 02	10.5	23 08	11.2	714	30	02.0	14 14	-04.1	23 01	-00.7
46004	51.0N	136.0W	718	30	15.4	20 23	10.7	09 05	13.6	718	30	14.8	21 00	13.2	07 14	13.8	718	30	01.4	01 14	-02.9	09 05	-00.2
46005	46.0N	131.0W	718	30	17.6	05 23	11.3	25 07	15.4	718	30	18.5	03 23	14.7	29 12	17.6	719	30	-00.6	06 01	-05.9	25 07	-02.2
46006	40.7N	137.7W								719	30	18.9	08 00	17.5	01 13	18.1							
46010	46.2N	124.2W	498	22	19.7	23 21	10.6	29 13	14.6	500	22	17.3	15 00	12.0	16 16	14.7	503	22	05.6	23 21	-03.2	17 17	00.0
46011	34.9N	120.9W	720	30	21.9	24 03	12.4	06 17	15.9	720	30	19.3	19 06	13.4	05 08	16.7	720	30	03.5	24 03	-04.3	12 09	-00.7
46012	37.4N	122.7W	716	30	16.8	18 23	11.8	06 17	14.4	716	30	16.0	01 08	12.8	09 11	14.5	716	30	01.6	17 00	-03.3	01 08	-00.1
46013	38.2N	123.3W	719	30	16.1	18 21	10.6	01 17	13.8	719	30	15.7	18 22	10.2	07 15	12.6	719	30	04.9	05 00	-02.6	22 06	01.2
46014	39.2N	124.0W	719	30	18.2	25 03	10.9	24 06	14.6	719	30	16.6	25 01	10.3	13 13	13.9	719	30	03.9	12 22	-02.4	09 19	00.7
46016	63.3N	170.3W	217	29	08.5	06 03	00.1	20 14	04.6														
46017	60.3N	172.3W	210	30	08.5	07 00	00.7	20 12	05.1														
46018	60.3N	177.0W	240	30	08.4	04 00	01.3	21 15	05.7														
46019	57.2N	170.3W	240	30	08.8	03 00	01.0	27 06	06.3														
46020	55.9N	168.0W	236	30	10.1	03 03	04.7	21 17	07.6	237	30	09.3	01 03	07.8	28 21	08.7	239	30	00.6	03 03	-04.4	21 12	-01.1
46021	57.7N	160.0W	238	30	10.0	04 03	05.2	22 12	08.0	239	30	09.2	09 23	06.8	21 15	07.7	240	30	02.4	15 06	-02.0	22 12	00.3
46022	40.8N	124.5W	718	30	17.9	03 23	10.5	14 20	13.8	718	30	16.8	03 23	10.5	17 06	13.0	718	30	03.2	20 21	-02.0	02 16	00.3
46023	34.3N	120.7W	718	30	20.7	24 04	13.2	06 19	16.6	718	30	19.6	18 21	13.6	06 14	17.7	718	30	02.7	24 04	-03.2	12 04	-00.4
46024	33.0N	119.2W	719	30	21.1	24 19	14.4	06 07	17.3	719	30	20.7	17 22	16.4	01 10	18.4	719	30	02.1	24 20	-04.3	06 07	-01.0
46025	33.8N	119.3W	719	30	22.5	04 00	16.1	06 19	19.0	719	30	21.5	11 21	17.6	27 11	19.6	719	30	02.4	04 00	-03.5	06 10	-00.6
46026	37.8N	122.7W	484	21	20.3	11 16	11.7	22 11	14.2	484	21	16.0	25 00	11.8	28 06	14.3	484	21	06.7	11 16	-03.0	22 11	-00.1
51001	23.4N	162.3W	713	30	27.9	15 01	24.3	01 11	26.4	713	30	28.4	15 03	26.6	26 11	27.1	713	30	00.2	10 03	-02.7	06 16	-00.7

SEPTEMBER 1982			PRESSURE (MB)							WIND SPEEDS (KNOTS)				MEAN WIND SPEED (KNOTS)								
BUOY	LAT	LONG	OBS	DAYS	MAX	DY HR	MIN	DY HR	MEAN	OBS	MAX	DY HR	DIR	N	NE	E	SE	S	SW	W	NW	TOTAL
41001	34.7N	072.3W	719	30	1024.5	01 02	1008.5	16 09	1017.0	718	31	22 08	150	13.9	12.3	9.9	15.7	14.9	9.3	7.6	11.0	12.9
41002	32.3N	075.3W	720	30	1022.3	01 02	1009.7	26 09	1016.2	720	22	22 02	250	10.8	11.8	8.9	7.5	9.6	10.2	8.5	8.4	10.2
41006	29.3N	077.3W	719	30	1020.9	01 02	1008.9	26 09	1015.8	701	24	26 15	260	8.6	9.3	7.3	7.1	9.3	9.0	8.6	5.5	08.1
42001	25.9N	089.7W	720	30	1019.3	13 16	1010.5	25 21	1014.7	702	24	23 02	050	9.6	11.5	10.6	10.1	12.5	9.9	8.2	8.3	10.7
42002	26.0N	093.5W	150	07	1014.8	25 03	1010.9	26 22	1012.8	146	19	25 19	030	9.9	9.8	12.1	11.3	10.0			1.0	10.7
42003	26.0N	086.0W	718	30	1019.3	13 16	1007.0	25 23	1014.0	704	22	08 05	090	7.3	10.0	7.6	7.5	6.1	8.6	8.5	7.3	08.3
42007	30.1N	088.9W	719	30	1022.2	23 17	1009.9	26 09	1016.0	709	24	22 06	010	10.9	12.1	9.4	7.5	5.1	4.7	5.1	8.2	09.3
42008	28.7N	095.3W	220	10	1016.5	07 17	1010.5	10 06	1015.5	218	25	09 11	040	11.3	14.8	10.8	9.9	6.2	3.0	3.0	3.0	11.8
44003	40.8N	068.5W	720	30	1026.8	13 14	1008.3	03 20	1017.9	697	20	29 21	060	10.8	10.6	8.0	5.9	9.7	8.3	7.7	6.1	08.8
44004	39.0N	070.0W	711	30	1025.5	13 14	1009.0	16 08	1017.5	705	22	03 07	210	13.5	11.7	9.5	9.9	10.2	13.7	9.3	7.0	11.2
44005	42.7N	068.3W	719	30	1028.6	30 04	1006.2	03 09	1018.3	716	29	02 11	200	11.9	13.0	11.4	6.0	9.8	12.1	10.9	8.0	11.0
44007	43.5N	070.1W	701	30	1031.6	29 17	1003.5	03 11	1019.1	679	20	24 07	250	8.7	8.6	7.6	6.6	8.9	9.3	8.3	5.8	08.4
44008	40.5N	069.4W	711	30	1026.6	13 14	1008.1	03 20	1017.9	701	20	07 16	040	10.5	12.0	8.8	6.5	11.8	10.1	9.7	7.5	10.2
45001	48.0N	087.6W	719	30	1031.9	06 18	1001.3	02 11	1015.8	712	27	29 04	160	12.6	13.0	9.4	9.8	9.9	9.2	9.3	9.7	10.4
45002	45.3N	086.3W	719	30	1020.8	07 15	1003.4	02 15	1016.8	705	21	20 22	350	12.6	10.5	8.0	7.5	11.2	12.3	8.2	12.5	11.3
45003	45.3N	082.8W	720	30	1031.8	07 15	1001.2	02 20	1017.1	710	21	03 13	290	7.5	9.9	7.3	7.6	9.4	9.2	9.5	10.6	09.1
45004	47.2N	086.5W	718	30	1031.0	06 19	1001.3	02 14	1016.3	709	21	20 19	350	10.1	10.4	7.4	8.1	8.3	8.7	7.9	9.4	08.9
45005	41.7N	082.5W	719	30	1027.6	08 15	1004.3	02 21	1018.0	700	21	03 01	310	8.4	7.1	8.0	7.2	6.5	9.7	9.8	11.5	09.0
45006	47.3N	090.0W	719	30	1031.7	06 17	1003.8	02 08	1015.9	701	22	24 18	030	11.0	12.3	10.4	7.2	8.2	8.8	8.8	8.6	09.5
45007	42.7N	087.1W	718	30	1027.8	07 16	1006.2	02 15	1017.1	717	21	21 15	330	12.3	8.0	9.5	8.4	9.2	10.3	8.5	13.3	10.4
45008	44.3N	082.4W	719	30	1030.7	07 15	1001.9	02 20	1017.2	715	21	03 09	280	8.2	11.3	8.8	6.1	10.1	9.9	11.5	11.4	10.0
46001	56.0N	148.0W	720	30	1023.8	27 21	985.3	06 14	1009.8	714	27	05 23	180	7.8	16.9	9.7	14.6	16.4	10.6	11.2	11.0	12.6
46002	42.5N	130.0W	717	30	1028.5	10 20	1008.3	25 01	1019.9	706	26	25 17	250	14.9	11.7	7.9	3.3	7.9	10.1	11.2	15.0	13.1
46003	52.0N	156.0W	714	30	1031.8	23 21	996.1	18 02	1010.1	715	39	21 00	160	16.4	16.6	17.1	21.5	23.1	17.9	19.0	16.1	19.3
46004	51.0N	136.0W	718	30	1034.2	14 21	1001.2	06 16	1018.6	714	32	06 15	190	9.6	5.9	7.9	11.0	13.3	13.5	12.3	10.8	11.6
46005	46.0N	131.0W	718	30	1028.3	14 18	994.8	25 15	1019.0	715	31	25 14	180	12.3	6.5	4.0	10.3	15.4	14.9	17.8	15.5	14.8
46006	40.7N	137.7W	719	30	1033.1	11 19	1011.0	20 11	1023.6	717	32	24 13	310	12.6	12.3	14.4	12.4	14.1	11.3	13.7	19.9	13.8
46010	46.2N	124.2W	502	22	1024.3	10 23	1002.9	26 10	1015.8	495	27	26 06	170	10.8	7.0	7.7	7.1	13.1	7.3	6.5	10.4	09.8
46011	34.9N	120.9W	720	30	1018.0	01 18	1006.9	29 23	1012.1	714	27	26 11	320	8.1	5.8	3.0	3.9	6.6	5.8	5.2	13.9	10.9
46012	37.4N	122.7W	715	30	1019.6	01 18	1008.4	29 11	1013.8	696	34	29 11	320	10.5	3.2	3.4	5.4	7.9	5.8	4.2	12.5	10.4
46013	38.2N	123.3W	719	30	1021.0	01 19	1009.7	08 02	1014.6	686	34	29 03	320	7.6	3.4	4.1	4.9	6.7	3.2	4.8	16.0	13.8
46014	39.2N	124.0W	718	30	1020.7	01 20	1010.7	28 01	1014.9	692	32	10 21	330	10.2	4.1	3.5	4.5	7.2	6.0	3.9	19.8	13.1
46016	63.3N	170.3W	217	29	1019.3	28 06	982.0	22 00	1004.8	212	37	07 03	020	17.3	10.8	10.1	15.5	8.4	6.6	16.5	6.7	15.8
46017	60.3N	172.3W	210	30	1020.3	27 21	986.5	25 18	1005.0	209	31	17 18	050	13.5	19.8	16.2	9.7	16.5	10.6	15.2	6.9	15.7
46018	60.3N	177.0W	240	30	1018.4	28 03	984.2	26 00	1005.5	236	28	07 03	350	17.3	17.7	13.5	15.6	10.2	13.1	17.0	17.3	16.2
46019	57.2N	170.3W	240	30	1020.5	23 03	989.8	16 00	1005.7	240	32	17 21	020	18.2	18.3	14.5	8.4	9.6	11.7	11.4	15.8	15.3
46020	55.9N	168.0W	233	30	1022.5	23 06	987.8	17 12	1004.2	237	31	06 21	320	14.9	15.5	12.3	9.0	15.9	12.2	18.0	17.4	15.4
46021	57.7N	160.0W	239	30	1024.7	23 15	981.5	21 06	1003.0	237	33	13 00	040	8.0	14.3	15.1	11.9	13.7	13.7	10.0	10.8	12.2
46022	40.8N	124.5W	718	30	1022.8	04 16	1010.4	15 03	1016.3	691	24	11 02	340	10.5	4.1	3.4	4.6	5.4	7.0	4.3	8.8	08.0
46023	34.3N	120.7W	718	30	1016.9	01 18	1006.8	29 23	1011.8	697	26	03 07	320	14.6	7.2	5.3	4.8	7.1	5.7	5.2	16.3	13.7
46024	33.0N	119.2W	719	30	1016.4	17 18	1006.0	30 00	1011.5	698	31	27 14	310	9.0	4.6	6.7	7.3	5.1	5.1	6.8	15.1	11.6
46025	33.8N	119.3W	719	30	1016.9	17 19	1005.6	29 23	1011.7	711	21	26 21	290	4.5	2.6	4.0	5.8	4.8	4.4	7.3	7.6	06.3
46026	37.8N	122.7W	484	21	1017.0	18 05	1009.1	29 13	1013.4	468	24	29 05	310	3.6	2.9	3.8	4.0	6.2	5.2	5.6	11.7	08.9
51001	23.4N	162.3W	713	30	1019.4	10 08	1013.4	14 03	1016.1	711	23	24 17	080	4.0	12.6	15.0	9.1	1.0	1.0			14.2

SEPTEMBER 1982			WAVE HEIGHTS (METERS)				FREQUENCY OF WAVE HEIGHTS (%)							
BUOY	LAT	LONG	OBS	MAX	DY HR	MEAN	<1M	1-1.5M	2-2.5M	3-3.5M	4-5.5M	6-7.5M	8-9.5M	>9.5M
41001	34.7N	072.3W	717	3.5	22 10	1.4		71.9	26.2	1.8				
41002	32.3N	075.3W	708	3.0	22 13	1.5	1.9	74.2	22.1	1.5				
41006	29.3N	077.3W	718	3.0	27 00	1.5	2.9	71.5	24.5	0.9				
42001	25.9N	089.7W	720	2.0	01 06	0.8	42.2	54.5	3.1					
42002	26.0N	093.5W	150	2.0	30 05	0.9	28.0	71.3	0.6					
42003	26.0N	086.0W	662	2.0	01 00	0.7	60.7	38.0	1.2					
44003	40.8N	068.5W	718	3.5	17 16	1.4	10.4	62.1	26.1	1.2				
44004	39.0N	070.0W	687	3.0	17 20	1.3	10.7	64.6	24.3	0.2				
44005	42.7N	068.3W	717	2.5	24 08	1.0	33.0	58.2	8.6					
44007	43.5N	070.1W	597	2.0	17 20	0.7	57.7	41.8	0.3					
44008	40.5N	069.4W	695	3.0	03 14	1.2	16.9	62.8	19.7	0.4				
45001	48.0N	087.6W	709	3.0	24 20	0.9	42.3	45.8	11.5	0.2				
45002	45.3N	086.3W	713	2.5	17 18	1.0	30.4	55.2	14.3					
45003	45.3N	082.8W	719	2.5	03 12	0.7	58.6	35.1	6.1					
45004	47.2N	086.5W	716	3.0	20 16	0.7	61.0	29.8	7.9	1.1				
45005	41.7N	082.5W	719	2.0	07 08	0.5	67.7	30.7	1.5					
45006	47.3N	090.0W	717	3.0	14 20	0.8	54.9	35.4	8.5	1.1				
45007	42.7N	087.1W	718	3.0	25 15	0.9	46.6	39.1	14.0	0.1				
45008	44.3N	082.4W	717	2.5	15 00	0.9	46.5	43.2	10.1					
46001	56.0N	148.0W	717	5.5	15 21	2.5		21.0	44.3	23.8	10.7			
46002	42.5N	130.0W	714	5.0	25 13	2.0	1.4	39.2	41.5	12.1	5.6			
46003	52.0N	156.0W	708	6.0	13 12	2.8		14.8	36.2	27.4	21.1	0.2		
46004	51.0N	136.0W	718	4.0	06 17	1.9	1.2	41.6	46.7	9.3	0.9			
46005	46.0N	131.0W	715	4.5	25 15	1.9	0.4	48.3	33.2	16.6	1.2			
46006	40.7N	137.7W	715	6.0	25 17	1.8	4.4	55.5	30.7	3.3	5.7	0.1		
46010	46.2N	124.2W	413	5.5	29 03	1.6	0.7	69.4	19.3	5.3	5.0			
46011	34.9N	120.9W	717	3.5	13 08	1.8	0.6	49.7	38.0	11.4				
46012	37.4N	122.7W	712	4.0	27 08	1.7	1.5	57.5	26.1	14.1	0.5			
46013	38.2N	123.3W	718	3.5	11 00	1.6	7.1	51.2	30.5	11.1				
46014	39.2N	124.0W	716	4.5	11 02	2.0	1.9	47.0	21.3	26.8	2.7			
46022	40.8N	124.5W	713	4.5	11 04	1.8	1.9	48.9	33.8	13.0	2.2			
46023	34.3N	120.7W	717	4.5	26 16	2.1	0.9	29.5	49.6	16.0	3.7			
46024	33.0N	119.2W	716	4.0	27 00	1.5	3.4	74.1	17.3	3.4	1.5			
46025	33.8N	119.3W	718	3.0	26 21	1.1	17.9	72.1	8.0	1.8				
46026	37.8N	122.7W	484	3.0	29 14	1.3	21.4	46.6	31.6	0.2				
51001	23.4N	162.3W	708	3.5	17 04	2.1		25.8	67.7	6.3				

SEPTEMBER 1987			TOTAL FREQUENCY OF WIND SPEEDS (%)							TOTAL FREQUENCY OF WIND DIRECTIONS (%)							
BUOY	LAT	LONG	CALM	<4KT	4-10KT	11-21KT	22-33KT	34-47KT	>47KT	N	NE	E	SE	S	SW	W	NW
41001	34.7N	072.3W		1.8	30.2	63.6	4.3			10.3	28.2	12.6	15.7	13.7	2.0	1.6	7.8
41002	32.3N	075.3W		6.4	44.7	48.8	0.1			8.7	34.1	11.1	9.5	21.5	10.6	3.1	1.5
41006	29.3N	077.3W		13.4	62.2	24.1	0.3			9.8	14.8	26.1	17.7	14.8	8.8	3.6	4.4
42001	25.9N	089.7W		7.0	42.3	49.9	0.9			8.1	23.7	35.8	17.2	9.3	2.5	1.5	1.8
42002	26.0N	093.5W		5.5	35.6	58.9				19.0	17.6	18.2	36.0	8.6			0.7
42003	26.0N	086.0W	0.6	13.6	54.5	31.7	0.1			5.2	35.5	26.4	16.2	7.7	3.9	1.2	3.9
42007	30.1N	088.9W		13.0	49.5	36.7	0.8			12.5	28.6	20.0	17.1	5.4	4.2	5.1	7.1
42008	28.7N	095.3W		1.8	34.4	62.8	0.9			8.4	39.7	23.6	21.4	5.0	1.4	0.3	0.1
44003	40.8N	068.5W		8.6	57.5	33.9				10.4	22.6	16.4	8.2	10.3	10.0	10.7	3.5
44004	39.0N	070.0W		8.1	32.6	58.9	0.3			13.8	25.0	11.2	5.0	6.2	17.8	12.5	8.7
44005	42.7N	068.3W		7.3	39.8	50.1	2.8			11.6	18.7	13.0	8.4	10.0	10.9	7.8	3.6
44007	43.5N	070.1W		10.8	57.9	31.4				16.3	17.3	7.3	5.8	14.2	23.1	9.6	6.3
44008	40.5N	069.4W		5.1	46.9	47.9				13.1	26.7	14.8	7.3	8.2	16.5	10.7	2.6
45001	48.0N	087.6W		4.5	49.3	45.5	0.7			14.1	11.2	3.9	5.5	27.7	18.7	11.7	7.1
45002	45.3N	086.7W		5.7	34.2	60.1				18.2	11.1	4.1	6.2	17.6	28.0	4.6	10.2
45003	45.3N	082.8W		5.4	62.1	32.5				7.5	9.4	11.5	6.4	26.8	13.3	8.5	16.5
45004	47.2N	086.5W		7.1	62.6	30.3				14.4	9.5	4.5	10.6	20.3	23.3	6.0	11.3
45005	41.7N	082.5W		9.9	58.6	31.6				7.9	6.0	12.1	10.5	11.6	21.5	10.2	20.2
45006	47.3N	090.0W		6.1	55.3	38.4	0.1			9.0	17.2	9.4	10.2	15.2	22.3	10.2	6.5
45007	42.7N	087.1W		6.8	44.8	48.4				21.5	6.9	4.3	9.4	29.5	11.4	4.1	12.9
45008	44.3N	082.4W		6.3	50.8	42.9				7.9	13.6	7.1	6.9	30.9	13.0	6.9	13.8
46001	56.0N	148.0W		5.0	34.2	54.8	6.0			3.7	1.9	2.8	8.5	25.4	21.0	24.6	12.1
46002	42.5N	130.0W		3.5	28.5	64.9	3.1			34.8	13.4	0.5	0.2	2.7	13.3	12.3	22.8
46003	52.0N	156.0W		1.1	8.0	50.8	39.3	0.8		2.8	3.1	3.7	4.2	25.5	23.0	27.2	10.5
46004	51.0N	136.0W		6.7	38.8	50.4	4.1			10.0	2.5	4.8	8.8	7.9	25.3	17.9	22.7
46005	46.0N	131.0W		0.8	20.6	67.8	10.8			23.3	0.9	0.3	1.1	5.7	13.7	14.2	40.8
46006	40.7N	137.7W		1.5	24.0	65.6	8.9			28.5	10.5	7.8	2.6	10.7	12.7	3.8	15.3
46010	46.2N	124.2W		11.3	46.5	40.6	1.6			20.3	7.2	10.3	5.0	22.0	6.5	9.8	18.9
46011	34.9N	120.9W		12.9	41.9	36.6	8.7			10.4	4.3	2.6	3.5	6.3	5.5	5.7	61.7
46012	37.4N	122.7W		9.5	49.0	35.6	5.8	0.1		33.0	1.5	2.0	4.9	11.0	2.4	1.7	43.5
46013	38.2N	123.3W		9.8	30.8	38.6	20.7	0.1		5.9	1.0	4.0	4.7	6.8	1.3	3.4	72.8
46014	39.2N	124.0W		12.7	37.1	25.3	24.9			26.2	7.0	5.6	5.8	5.9	2.6	1.4	45.5
46016	63.3N	170.3W		5.7	28.3	37.7	26.9	1.4		34.3	32.0	4.8	8.3	4.7	3.2	6.3	6.5
46017	60.3N	172.3W		4.3	22.5	50.2	23.0			6.8	34.6	14.5	9.6	10.5	12.0	10.0	2.0
46018	60.3N	177.0W			19.9	61.9	16.2			41.8	10.6	6.6	12.7	5.0	8.4	5.1	9.9
46019	57.2N	170.3W		2.1	22.1	59.2	16.7			28.8	19.6	4.1	3.4	5.1	13.8	11.0	14.3
46020	55.9N	168.0W		0.4	27.0	53.2	19.4			18.9	11.6	5.4	4.6	8.6	11.9	11.3	27.6
46021	57.7N	160.0W			47.3	44.7	8.0			9.1	5.3	16.5	10.8	7.5	16.5	10.7	7.8
46022	40.8N	124.5W		21.1	50.9	27.1	0.9			46.5	7.1	4.4	10.6	11.5	7.6	2.0	10.3
46023	34.3N	120.7W		7.7	27.7	50.6	13.9			12.7	0.8	1.6	5.3	11.6	1.9	2.1	63.9
46024	33.0N	119.2W		9.5	36.7	45.6	8.3			1.8	1.9	2.9	7.8	8.9	7.4	8.6	60.6
46025	33.8N	119.8W		21.7	67.5	10.8				3.2	1.4	4.2	10.2	11.5	12.0	36.7	20.8
46026	37.8N	122.7W		18.6	47.4	32.1	1.9			4.5	1.8	4.1	3.3	11.1	6.3	10.7	58.2
51001	23.4N	162.3W		3.7	10.1	84.4	1.8			0.5	23.0	74.7	1.6	0.1	<.05		

SEPTEMBER 1987			% FREQUENCY OF WIND SPEEDS (<4 KTS)								% FREQUENCY OF WIND SPEEDS (4-10 KTS)								% FREQUENCY OF WIND SPEEDS (11-21 KTS)							
BUOY	LAT	LONG	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW
41001	34.7N	072.3W	0.3	0.1	0.6	0.1	0.1	0.2	0.1	0.3	4.1	9.4	6.5	2.1	1.8	1.0	1.4	4.0	13.5	10.1	5.5	11.7	11.1	0.7	0.1	3.0
41002	32.3N	075.3W	0.1	0.3	1.4	2.1	1.1	0.6	0.5	0.3	3.2	9.8	5.7	5.1	13.3	4.9	1.8	0.9	5.3	24.0	4.0	2.3	7.1	5.0	0.7	0.3
41006	29.3N	077.3W	1.8	1.4	3.5	2.1	0.7	1.8	0.8	1.3	4.3	8.7	18.8	12.9	9.2	3.6	1.6	3.1	3.7	4.7	3.9	2.4	4.9	3.5	1.1	
42001	25.9N	089.7W	1.3	1.1	2.0	1.2	1.1	0.1		0.1	2.8	10.6	15.8	7.6	2.0	1.1	1.1	1.2	4.0	11.2	17.9	8.4	6.0	1.3	0.5	0.6
42002	26.0N	093.5W	2.7	2.1						0.7	6.3	7.4	5.1	11.1	5.7				9.9	8.2	13.0	24.8	2.9			
42003	26.0N	086.0W	1.2	2.5	3.4	1.9	2.7	0.7	0.3	1.0	2.7	16.1	16.8	11.8	3.8	1.2	0.2	2.0	1.3	17.0	6.0	2.5	1.2	2.0	0.6	1.0
42007	30.1N	088.9W	0.7	1.4	1.9	2.4	1.6	1.6	2.2	1.1	5.9	9.3	10.4	11.4	3.7	2.5	2.6	3.6	5.1	17.8	7.7	3.2	0.1	0.1	0.2	2.4
42008	28.7N	095.3W					0.9	0.5	0.3	0.1	3.4	4.8	9.3	12.5	3.4	0.9			4.9	33.9	14.3	8.9	0.7			
44003	40.8N	068.5W	0.1	0.7	1.9	1.4	0.3	1.3	1.9	1.0	4.5	10.7	9.6	6.5	6.2	12.5	5.8	2.1	5.7	11.7	4.9	0.3	3.8	4.1	3.0	0.4
44004	39.0N	070.0W	0.7	0.4	1.2	0.6	0.6	0.7	1.9	1.8	3.0	6.8	4.2	2.1	2.6	2.4	6.3	5.3	10.0	17.6	5.8	2.1	2.9	14.6	4.3	1.6
44005	42.7N	068.3W	0.7	0.9	1.0	1.4	1.6	0.5	0.6	0.5	3.5	4.1	4.0	6.3	10.4	6.2	3.4	2.0	6.8	13.1	8.0	0.7	5.4	11.6	3.4	1.1
44007	43.5N	070.1W	1.5	1.0	0.8	1.2	0.8	1.7	1.5	2.3	8.9	10.9	5.3	3.9	9.3	12.6	4.3	2.8	5.9	5.6	1.2	0.7	4.2	8.8	3.7	1.2
44008	40.5N	069.4W	0.2	<.05	1.2	1.6	0.6	0.8	0.6	0.1	6.1	8.2	9.7	5.0	1.9	7.8	6.0	2.4	6.8	10.5	4.0	0.7	5.7	7.9	4.1	0.2
45001	48.0N	087.6W	0.4	0.7	0.2	0.3	0.6	0.9	1.2	0.6	5.7	2.8	1.9	3.3	15.3	11.5	5.9	2.9	7.9	8.2	1.8	1.8	11.4	6.3	4.6	3.6
45002	45.3N	086.7W	1.6	0.7	0.6	0.5	0.7	0.4	0.7	0.5	3.4	4.7	2.4	4.8	6.6	6.7	2.5	3.0	13.1	5.7	1.1	0.9	10.2	20.9	1.4	6.7
45003	45.3N	082.8W	0.5	0.7	0.5	0.7	0.6	0.3	1.3	0.7	5.8	4.6	9.9	4.2	17.5	8.4	3.9	7.9	1.2	4.1	1.1	1.6	8.7	4.5	3.3	8.0
45004	47.2N	086.5W	1.6	0.6	0.5	1.0	1.1	0.9	0.8	0.5	6.1	4.7	3.6	8.1	14.7	15.7	3.5	6.2	6.7	4.2	0.4	1.5	4.5	6.7	1.7	4.6
45005	41.7N	082.5W	0.6	1.0	2.2	1.4	2.0	1.6	0.4	0.7	6.1	3.6	7.3	7.9	8.9	11.3	5.6	7.9	1.2	1.3	2.7	1.2	0.7	8.6	4.2	11.7
45006	47.3N	090.0W	0.5	0.7	1.3	0.8	1.0	0.5	0.8	0.5	4.0	5.4	2.4	8.2	10.5	15.2	5.8	3.8	4.4	10.9	5.8	1.7	3.7	6.6	3.6	2.2
45007	42.7N	087.1W	1.1	1.2	0.5	0.7	2.2	0.5		0.6	5.7	3.3	1.7	6.2	17.6	4.8	2.7	2.8	14.7	2.5	2.0	7.5	9.7	6.1	1.4	9.5
45008	44.3N	082.4W	[illegible]	0.9	0.2	0.3	1.2	0.5	0.4	0.9	5.6	4.8	4.4	4.4	17.0	6.4	3.3	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	12.7	[illegible]	[illegible]	[illegible]
46001	56.0N	148.0W	0.6	<.05	0.1	0.3	0.7	0.9	1.3	1.1	1.8	0.1	1.3	2.0	3.6	9.7	10.7	5.0	1.3	1.8	1.4	5.5	17.5	10.3	11.3	5.7
46002	42.5N	130.0W	0.3	0.9		0.2	0.1	0.7	1.0	0.3	5.2	4.5	0.4	<.05	2.2	7.2	6.6	2.6	29.1	8.3	0.1		0.4	4.6	3.7	18.6
46003	52.0N	156.0W						0.6	0.4	0.1	0.3	<.05	0.5	0.7	0.7	1.6	2.6	1.5	2.5	2.9	2.5	0.6	6.8	15.1	13.0	7.4
46004	51.0N	136.0W	1.0	0.7	1.0	0.9	0.4	0.6	0.8	1.4	5.5	1.4	2.6	3.0	2.1	6.9	6.7	10.7	3.5	0.5	1.2	4.9	4.5	16.4	8.9	10.7
46005	46.0N	131.0W	0.1				0.7				7.6	0.9	0.3	0.3	0.4	0.9	1.9	7.8	15.8	<.05		0.4	4.3	12.3	8.3	26.9
46006	40.7N	137.7W	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
46010	46.2N	124.2W	1.4	1.2	1.6	0.7	1.5	1.9	1.9	1.2	7.6	4.4	6.2	3.5	4.6	3.5	7.0	9.2	11.3	1.1	2.6	0.7	14.7	1.2	1.0	8.1
46011	34.9N	120.9W	2.0	1.1	1.7	1.4	1.1	0.8	2.1	2.8	5.6	2.6	0.9	2.1	4.9	4.7	3.2	17.9	2.7	0.6			<.05	<.05	0.4	32.5
46012	37.4N	122.7W	2.0	0.9	1.2	1.1	0.6	0.4	0.8	2.3	15.2	0.5	0.8	3.7	8.5	2.0	0.9	17.3	14.5				[illegible]	0.1		19.2
46013	38.2N	123.3W	0.9	0.4	1.9	1.5	0.7	0.8	1.8	1.8	3.2	0.6	2.1	3.0	5.9	0.6	1.3	14.1	1.7						0.3	36.2
46014	39.2N	124.0W	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	19.2
46016	63.3N	170.3W	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
46017	60.3N	172.3W	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
46018	60.3N	177.0W									[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
46019	57.2N	170.3W	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
46020	55.9N	168.0W						0.4			5.4	3.1	3.7	3.8	2.4	3.9	0.3	4.4	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	7.9	16.0
46021	57.7N	160.0W									7.6	2.4	3.3	8.1	3.9	6.9	11.3	4.2	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
46022	40.8N	124.5W	4.1	3.4	2.6	4.1	2.9	0.8	0.8	2.4	19.7	3.4	1.7	6.5	8.2	6.0	1.2	4.1	21.9	0.3			[illegible]	[illegible]		3.7
46023	34.3N	120.7W	0.1		0.4	2.8	1.2	0.5	0.9	1.8	2.9	0.8	1.2	2.4	9.5	1.4	0.9	8.6	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
46024	33.0N	119.2W	0.3	0.4	0.3	1.4	2.7	2.2	1.4	0.8	0.5	1.5	2.5	5.2	5.3	5.0	5.7	11.1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
46025	33.8N	119.8W	1.1	1.0	1.6	1.9	2.7	4.4	5.6	3.4	2.1	0.4	2.6	7.8	8.7	7.5	26.1	12.3	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
46026	37.8N	122.7W	2.6	1.4	2.0	1.3	2.4	1.0	2.5	5.3	1.9	0.4	2.1	1.8	7.7	5.3	7.0	20.5	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
51001	23.4N	162.3W	0.2	1.4	1.4	0.5	0.1	<.05			0.3	4.1	5.4	0.3					17.2	66.4	0.8					

SEPTEMBER 1987			% FREQUENCY OF WIND SPEEDS (22- 33 KTS)								% FREQUENCY OF WIND SPEEDS (34-47 KTS)								% FREQUENCY OF WIND SPEEDS (>47 KTS)							
BUOY	LAT	LONG	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW
41001	34.7N	072.3W	0.5	0.6	0.1	1.8	0.8	<.05		0.5																
41002	32.3N	075.3W						<.05	0.1																	
41006	29.3N	077.3W				0.1			0.1																	
42001	25.9N	089.7W		0.7			0.1																			
42002	26.0N	093.5W																								
42003	26.0N	086.0W			0.1																					
42007	30.1N	088.9W	0.8	<.05																						
42008	28.7N	095.3W		0.9																						
44003	40.8N	068.5W																								
44004	39.0N	070.0W				0.1		0.2																		
44005	42.7N	068.3W	0.6	0.5			0.7	0.6	0.4																	
44007	43.5N	070.1W																								
44008	40.5N	069.4W																								
45001	48.0N	087.6W	0.1			0.1	0.4																			
45002	45.3N	086.7W																								
45003	45.3N	082.8W																								
45004	47.2N	086.5W																								
45005	41.7N	082.5W																								
45006	47.3N	090.0W		0.1																						
45007	42.7N	087.1W																								
45008	44.3N	082.4W																								
46001	56.0N	148.0W				0.7	3.5	0.1	1.3	0.4																
46002	42.5N	130.0W	0.1					0.8	1.1	1.1																
46003	52.0N	156.0W		0.1	0.7	2.8	16.7	5.8	11.5	1.7				0.1	0.7											
46004	51.0N	136.0W					0.9	1.5	1.6	<.05																
46005	46.0N	131.0W				0.1	0.5	0.4	3.9	5.8																
46006	40.7N	137.7W	0.8				0.3		0.8	7.1																
46010	46.2N	124.2W				0.2	1.1			0.4																
46011	34.9N	120.9W	0.1							8.6																
46012	37.4N	122.7W	1.3							4.5								0.1								
46013	38.2N	123.3W								20.7								0.1								
46014	39.2N	124.0W	0.4							24.4																
46016	63.3N	170.3W	9.7	13.0		1.4			2.8		0.7	0.7														
46017	60.3N	172.3W	0.5	14.1	1.7	0.5	2.3	0.5	3.2	0.2																
46018	60.3N	177.0W	6.5	3.1		2.1			1.3	3.3																
46019	57.2N	170.3W	8.2	4.9	1.0		0.7	0.9		0.8																
46020	55.9N	168.0W	3.5	2.2	0.9	0.3	2.2		3.1	7.2																
46021	57.7N	160.0W		1.4	2.4		1.3	2.6	0.3																	
46022	40.8N	124.5W	0.7							0.1																
46023	34.3N	120.7W	1.0							12.9																
46024	33.0N	119.2W								8.3																
46025	33.8N	119.3W																								
46026	37.8N	122.7W								1.9																
51001	23.4N	162.3W		0.3	1.5																					

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